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## ANNUAL GRADUATE FORTNIGHT

### INFECTIONS OF THE MIDDLE EAR

(ACUTE SYSTEMIC INFECTIONS FROM THE EAR)\*

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It has always seemed to me that of all the problems which are presented in the practice of medicine those concerning the general invasions are by far the most interesting. Discounting the bias which may naturally be ascribed to me, I nevertheless believe that the problems of the general invasions of otitic origin are second to none in their interest. The subject concerning which I have the privilege of addressing you this evening has many ramifications. I might say that for a number of years I have been concerned chiefly with the practical side of it.

For much of the scientific data which I am presenting to you I must quote most freely from Dr. Libman who perhaps more than any other man in America, has consistently contributed to the scientific aspect of this subject. I realize that perhaps this division with its attendant nomenclature may not be correct. I hope it will not be offensive, but inasmuch as it is obvious that the otologists bear the onus of this differentiation, I shall have to assume the burden.



I believe with Libman that it is essential at the outset to make use of an accurate terminology. "Otherwise one is very likely to make loose diagnoses and draw conclusions detrimental to the patient."

In the last few years the whole question of sepsis has been reopened particularly from the practical point of view in that we have found that transitory bacteriemias are much more common and perhaps much less serious than we had hitherto believed.

An invasion may be defined as the entrance of microorganisms into the general circulation without any reference to the effect of this invasion upon the patient. The term "invasion" then according to Schwartzman can be further subdivided into the so-called (1) transitory bacteremia and (2) septicemia. While the concept expressed by the term septicemia might have been clear it has unfortunately been so much abused and as a result is now so indefinite that it had better be eliminated and the term bacteremia substituted. Furthermore, the term bacteremia is capable of being paraphrased as per example streptococcemia, staphylococcemia and pneumococcemia, each one of which expresses a clear cut idea. A general invasion then is a bacteremia. A general invasion of otitic origin is a bacteremia in which suppurative disease in or about the ear acts as the primary focus. In order to identify each of these types of invasions bacteriologically, the following criteria may be accepted:

I. In transitory bacteriemias—(a) The number of organisms found in a blood culture is small. This is judged by the fact that solid media usually remain sterile and growth appears only in the fluid media and then in most instances only in the well enriched fluid media. (b) The blood cultures do not remain repeatedly positive. In our experience with acute rheumatic fever or ulcerative non-specific colitis, one positive culture would be obtained out of four or five taken. (c) The types of organism usually found in transitory bacteriemias as shown by Libman and others are *Streptococcus alpha*, *viridans* and *gamma* (non-

hemolytics). The source of invasion in transitory bacteriemias is most likely to be either the upper respiratory or the intestinal tract in which the above mentioned bacteria are found as normal inhabitants. There is experimental proof for this contention.

1. Bull and McKee recently reported experiments on rabbits in which they were able to obtain positive blood cultures shortly after depositing bacteria on the surface of the nasal mucous membrane.

2. Desonbry and Porcher demonstrated that bacteria of many varieties may pass through the intestinal mucosa during the digestion of fatty substances and are found for a few hours only in chyle and in the blood. These findings have been verified so often that it is now a rule in all institutes of sero-therapy to bleed the horses only when fasting, if it is desired to obtain sterile serum.

3. Epstein and Kugel showed that postmortem blood cultures taken from patients dying from all sorts of non-infectious diseases are positive in a large number of instances. Since the microorganisms found are usually enterococci (Hirsch Libman streptococci), it is likely that the source of invasion is either the intestinal or upper respiratory tract in which these organisms are commonly present.

The mechanism of transitory bacteriemias can be outlined as follows. Under certain debilitating conditions, bacteria enter the blood stream from the intestinal and respiratory tracts. The organisms which thus enter the blood are usually of low pathogenicity and incapable of doing serious injury. The blood, or one should say the body, has the power of ridding itself promptly of such organisms. The process of the prompt disappearance is not known definitely as yet. In view of the fact that bactericidins in the true sense of the word do not exist for streptococci, it would be more logical to assume that the invading organisms behave in the general circulation as inert particles of colloidal substance and that the reticulo-endo-

thelial system is responsible for their elimination from the blood. What is the clinical significance of a positive blood culture characterized as above? One should be very careful in accepting the findings as indicating the etiology of the disease. In each individual case the clinical evidence must be most carefully scrutinized and correlated with bacteriological findings.

In contrast to the transitory bacteriemias—

II. Bacteriemias in which we are particularly interested: (a) The number of bacteria found in most instances is large. This is demonstrated by the growth in the solid media and by the fact that all fluid media are usually positive. There are, of course, exceptions to this. (b) If the number of organisms found in the first blood culture is small, this is apt to increase progressively in subsequent blood cultures. (c) Blood cultures are repeatedly positive. (d) The organisms found belong to the actively pathogenic and virulent groups. It is evident that a bacteriemia (non-transitory) is the result of an inflammatory process which is in free communication with the general circulation and which is aroused by virulent pathogenic organisms.

In order to use the bacteriological findings advantageously for diagnoses, it is necessary to analyze closely these findings from the various points of view as outlined above.

While it is evident that otitic infections bear a close relationship chiefly to the second group of invasions, namely, the bacteriemias (non-transitory), it might be in order at this time to ask whether a suppurative otitis media can be a factor in the so-called transitory bacteriemia. So far as my experience goes and I must admit it is limited, it is my impression that as part of the upper respiratory tract and perhaps in conjunction with it, a middle ear infection may be a factor in a transitory bacteriemia. We have had an instance of pneumococcus infection in the ear and mastoid and pneumococcus type I cultured from the naso-

pharynx, with a transitory pneumococcemia beginning several days postoperative. The lungs showed no changes. But a single blood culture was positive. Recovery was uneventful.

In the 1912 communication on the importance of blood cultures in the study of infections of otitic origin, Libman reports 80 per cent positive results in cases of otitic invasion or sinus phlebitis. Perhaps because of changes in the media and other improvements in technic our own experience has been that we have positive blood cultures in nearly 90 per cent, so that I cannot understand those who would minimize the value of blood cultures in suspected otitic bacteriemias. In fact I have been astonished at the utter disregard of this to me important diagnostic aid on the part of some of our foreign colleagues.

It must be borne in mind that particularly in a general hospital cases of sinus thrombosis are received in all stages of their development. It is established that the thrombus formation is part of a reparative process. Yet the thrombus itself may become infected and subsequently re-infect the blood stream. On the other hand so long as the ends of the thrombus remain sterile and the area of phlebitis does not extend beyond them, the blood may remain sterile. Such a case may even be afebrile for a number of days. We have observed an instance of fluid pus in the lateral sinus with persistently sterile blood cultures.

In one hundred cases of otitic sinus thrombosis whose histories we have studied and in which blood cultures were made we have found the following:

In eighty-five (85), cultures showed streptococci, two of these were the anhemolytic variety. In three the streptococci could be grown only anaerobically. In one of the latter the preliminary blood culture showed an aerobic streptococcus. Following operation the symptoms of sepsis continuing, it was found that subsequent aerobic cultures were sterile, but that streptococci could be obtained with the anaerobic technic. It is peculiar that these organisms

should so rapidly have assumed the quality of anaerobiasis. It is particularly, however, in the presence of anaerobic streptococcus infection that the symptoms of sepsis evidence an excessively virulent nature. Two of the cases with anaerobic infections had lung abscesses, and one a large temporal lobe abscess. In only two of these one hundred cases studied was there a *B. mucosus* infection. A rather small proportion. Ten cases had sterile cultures; two *B. proteus*; one *Staphylococcus aureus*.

In no instance was a pneumococcus, except Type III, responsible for a sinus phlebitis. In addition to the case described above there were during the period encompassed by these case reports five additional cases of pneumococemia studied on the otological service. The first was admitted with a pneumococcus type I in the blood and spinal fluid and ceased on the day of admission. There was no postmortem. The second was admitted with a fulminating meningitis, with a pneumococcus type II in the blood and spinal fluid. No operation was performed. At the postmortem, no sinus phlebitis was found. The third was admitted with an acute mastoiditis with temperature 103.2 with a pneumococcus type IV in the blood. At the operation on the mastoid, the sinus was exposed and was normal. Later there developed a pneumonia at the right base. Recovery was uneventful. Fourth—three weeks after an operation for acute mastoiditis there was a chill and rise of temperature to 105, which persisted for forty-eight hours and then returned to normal. A blood culture taken during the chill showed a pneumococemia. Subsequent blood cultures were sterile. The sinus was exposed and looked normal. Patient recovered. Fifth—this patient was admitted to my service during the past winter. She was a child of six and had a temperature of 102.6 when admitted. Both ears were discharging; there was no evidence of mastoiditis. The child appeared gravely ill. Physical examination otherwise negative. On the night of her admission, the temperature rose precipitately to 105.2. Blood culture at this time showed a pneumococcus type IV. The ears cultured pneumococcus type I. For several days fol-

lowing the admission her temperature ranged between 102 and 104. The original x-ray of her chest was negative but the second x-ray showed a pneumonic area at the right base. During the interval before the positive x-ray report the question as to whether we could be dealing with a bacteriemia of otitic origin was discussed, and the possibility excluded on the basis of the pneumococcemia. I can only emphasize Libman's statement, namely, "it is essential that those who report such cases (i. e. sinus phlebitis due to pneumococci), give the exact description of the organism found and state their methods of identifying organisms in the pneumococcus streptococcus group." From my personal experience with cases of otitic bacteriemia, either under my care or seen in consultation, I do not believe the pneumococcus, except type III, is ever an etiological factor. It seems to me that pneumococci show little tendency to attack the veins. Turning to the pathological changes in the lungs attempting to confirm this opinion, Rabin states that in pneumonia of pneumococcus origin there is rarely an involvement of the pulmonary veins. Occasionally late in the disease there is found leucocytic infiltration in the walls of the very small veins on microscopic examination. More rarely, the walls are invaded by bacteria. A constant bacteriemia is not dependent upon the infection of the small veins alone. Lesions of the pulmonary vessels cannot be demonstrated as a cause for the invasion of the blood by the pneumococcus in the early stages of pneumonia. Thrombo-phlebitis of the macroscopic veins is the important cause of a persistent bacteriemia. A case of this character of pneumococcus origin has not come under our observation. On the other hand, in streptococcus infection of the lung phlebitis of the small veins is quite common. Occasionally the larger ones are involved and give rise to a general invasion.

Last winter I was asked to see a young man who had pneumonia. His illness began about ten days before with an acute upper respiratory infection and pain in both ears. During the first week and before the physical signs in his lungs developed, both ears had been opened, both mas-

toids operated upon and one jugular vein tied. Blood culture was sterile. From a mouse injected with the sputum pneumococcus type IV was cultured. It seemed obvious to me after such an experience that it was important to discuss at length the rôle of the pneumococcus in general invasions of otitic origin.

It must not be supposed, of course, that in the presence of signs and symptoms definitely indicating a bacteriemia, with a history of a recent or the presence of a suppurative otitis media and no other focus one should be deterred from the proper surgical interference because of a sterile blood culture. Yet the latter, if properly evaluated and correlated, is of great assistance in determining the immediate course of action.

Dr. Libman and I recently saw a young girl who had been operated upon for an acute mastoiditis. About a week following operation, she began a continuous irregularly septic temperature, had a leucocytosis and a rapidly progressive anemia. The hemoglobin dropped from 72 per cent to 52 per cent. There were no physical signs in the chest and no metastases. Four blood cultures at about forty-eight hour intervals made both aerobically and anaerobically were sterile. While we felt that in all probability she had an otitic sinus phlebitis, we advised against immediate interference. Finally the physical signs of bronchopneumonia with pleurisy appeared. Recovery was complete without any further surgery.

There have been a number of reports of general invasions with streptococcus in the presence of middle ear and mastoid disease in which neither macroscopically nor yet microscopically were there evidences of sinus phlebitis or thrombosis. So that in contra-distinction to the attitude of Libman, the belief that bacteriemia of otitic origin may occur without the presence of changes in the sinus wall has gained ground. The osteophlebitic theory of Körner received its quietus many years ago. It seems probable that the cases of so-called otitic invasion without changes in the cranial blood sinuses, belong to the bacteriemias of

unknown origin and should not be classed as otitic. If a cryptogenetic invasion can occur in the presence of uninfected ears, it is patent that a similar condition might exist in the presence of middle ear disease and the ear not be the focus of infection. Instances of this type, however, must be rare.

The local pathological changes in sinus phlebitis, that is the changes in the walls of the veins, formation of the thrombus, etc., are now too well known to require any discussion here. There are, however, several points with regard to the pathology of this condition which merit consideration. Fienidt and Blau reporting separately about 250 cases of sinus phlebitis state that pathological changes in the bony plates overlying the lateral sinus were present in almost 80 per cent of the cases. In his monograph, Braun states in most cases of sinus thrombosis the inflammatory tract can be followed macroscopically from the middle ear to the thrombus. There is necrotic bone in the mastoid which leads directly to the sinus wall. While I believe that this applies generally to all the cranial sinuses in contact with the temporal bone, no matter which is involved primarily through otitic disease, there is nevertheless a considerable number of instances of sinus phlebitis in which at the mastoid operation or during the subsequent uncovering of the sinus the bony plate over the latter gives no macroscopic evidence of disease, nor does the appearance of the vein wall itself, always give information as to its contents. What the pathway of infection is in these cases is still problematic.

We have observed a considerable number of cases of general invasions of otitic origin in which the mastoid was sclerosed but macroscopically free from any disease whatsoever. In these there can be no doubt that the infection passed directly through preformed pathways, either vessels or dehiscences from the middle ear to the jugular bulb. In 1928 Maybaum reported a series of nine cases of primary bulb thrombosis from the otological service of the Mount Sinai Hospital. In three of these the mastoid proc-



ess was pneumatic without any gross evidence of infection. In the remaining six the mastoid was sclerosed and not diseased. In every instance the sinus plate was intact. In seven of the nine there was an obturating thrombus in the sinus. One sinus contained fluid pus. In only one could a thrombus not be demonstrated. Of the nine, eight had positive blood cultures.

With the limited time allotted to me I cannot describe in detail the pathological changes (metastatic) in remote parts affected by this disease. Schwarz has repeatedly demonstrated that live streptococci may be excreted in the urine in children without any clinical evidence of kidney damage, and this condition may persist for some time until the blood becomes sterile. Indeed, streptococci may exist in structures probably less resistant to infections than the kidneys without clinical evidence of damage. Thus I have recently seen a patient with a streptococcemia due to a sinus thrombosis from whose spinal fluid streptococci were cultured. There were seven lymphocytes per cubic millimeter. There was no meningitis. The child recovered after operation on her lateral sinus and jugular. It is interesting to speculate regarding the manner in which the blood stream is relieved of the infectious agent. We have seen an instance of severe chill at night with colonies of streptococci too numerous to count in the blood culture taken at this time and twelve hours later the blood culture be sterile. This phenomenon was repeated three or four times. Instances of multiplication of bacteria in the blood in invasion of otitic origin have not come under my observation. Comparatively little attention has been paid to the lungs as one of the important organs whose activities result in the sterilization of the blood. Physical signs in the lungs in cases of otitic bacteriemia are quite frequent. From the analogy to experimental tuberculosis, there is considerable reason to believe that the lungs play an important rôle. In a rabbit injected intravenously with bovine tuberculosis, the lungs show the first evidence of the disease. Indeed death may occur before the other organs are involved. If, on the other hand, the rabbit be in-

jected intraperitoneally, the mesenteric glands, the liver and the spleen show tuberculous lesions while the lungs may remain intact until the last stage. The lungs, the liver and the spleen bear a similar relationship to the reticulo-endothelial system whose function it is to eliminate the organisms from the blood stream. Each organ, of course, in addition has its specific cells. It must not be forgotten that in bacteriemias of otitic origin, the invasion through the venous channel passes from the heart, primarily through the lungs. Perhaps a continuation and extension along experimental lines of the work on jugular cultures developed by Ottenberg may do much toward elucidating the question as to the activity of the lungs in this connection.

The occasional presence of abdominal pain without any physical signs as a symptom associated with bacteriemias of otitic origin is suggestive from the clinical side that the organs here too are in some manner involved.

So far as the symptoms generally are concerned they do not differ in their essentials from those of general invasions of other origins. It is true there are sometimes local manifestations such as dilatation of the veins of the scalp and edema due to the extension of the phlebitis and thrombosis to the superficial veins through the emissary. Of importance too as a local sign is the enlargement of the gland at the angle of the jaw. It is my impression that a gland in this situation involved through an adjacent phlebitis differs considerably from the ordinary adenitis secondary to an acute upper respiratory infection. In the former the gland is firmer and as a rule very much more tender. There is occasionally pain or a feeling of fullness in the homolateral side of the head or pain in the eye. Indeed the entire clinical picture may at the beginning closely resemble those instances of osteitis of the petrous pyramid with 5th and 6th nerve involvement. Occasionally the early symptoms of a sinus thrombosis resemble those of a brain abscess; there may even be physical signs suggestive of beginning pyramidal tract involvement. Fever, chills, sweats

are common, although the chills occur in but half of the cases and infrequently in children. The fever is often at first sustained at a high level and only after several days do the characteristic drops and subsequent rises occur. Frequently the character of the temperature curve more than the height to which the fever rises, suggests a general invasion. This is particularly true in the aged and debilitated. The pulse is usually rapid and corresponds at least in the beginning with the temperature. As the disease progresses the pulse rate increases. An excessively rapid pulse is of bad prognostic import. Enlargement of the spleen is common and not infrequently both spleen and liver are palpable. The characteristic mental condition is euphoric but the disease may begin with delirium or having persisted some time may be associated with a psychosis, a wildly delirious state resembling the mental symptoms of belladonna poisoning. A rapidly progressive anemia naturally follows the presence of hemolyzing organisms in the blood stream. As a rule there is a leucocytosis of moderate grade, not so marked as is usually found in erysipelas, pneumonia or meningitis. There may be a leucopenia.

Metastatic infections secondary to the otitic bacteriemias may occur anywhere in the body. It has seemed to me that they are more common in children than they are in adults. This has been so in our own cases and so far as the articular involvements are concerned the site of election in children has been the hip. Petechiæ I have not seen, particularly the white centered lesions of the conjunctiva which occur with endocarditis. It is my belief that the latter lesions do not complicate infectious foci on the venous side of the circulation.

One other sign has been of considerable help to us. I refer to changes in the ocular fundus. About 16 per cent of our cases show definite changes in the nerve head. In these definite changes I do not include congestion of the retinal vessels alone. The changes to which I refer range from blurring of the disc margins up to a measurable papilledema as high as four to five diopters.

It is a curious phenomenon that when a papilledema begins before operation it frequently increases after adequate surgical measures have been instituted which control the general invasion. It may increase in the absence of all other signs or symptoms and may last several months. No satisfactory explanation has been offered, since it may exist and even increase, with no other sign or symptom of increased intracranial pressure and finally go on to complete recovery.

I shall not burden you with a recital of the details of treatment nor with a discussion of those points in the treatment of this condition which are still more or less unsettled. It suffices to state that treatment is solely surgical. Broadly it consists of an attempt to destroy the continuity of and obliterate the infected vessel. In this connection it must not be forgotten that a spontaneous cure of a phlebitis of the lateral sinus can and not infrequently does occur. I have had no evidence which would make me believe that transfusions of any character contribute except indirectly to the establishment of cure. Transfusions contribute as does food or any other supportive measure and not otherwise.

# INFECTIONS OF THE ORAL CAVITY\*

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It is difficult to know just what to discuss in a short paper devoted to the infections of the oral cavity. In consulting with the Committee, I gathered that it would be better for me to deal with the more common lesions of the mouth and jaws rather than to attempt to cover too large a field this evening.

In the beginning I would like to call your attention to the fact that the mouth is a very unclean cavity and that the bones of the jaws become infected more often than any other bones of the body. The maxillary bones and mandible become infected in three ways, namely thru the *gum attachment, the gingival, the periodental route*; next thru *the teeth themselves* by means of caries opening into the pulp, entering the canal and thence thru the *apex into the bone*. This may be called the *intra-dental route*, as the infection travels thru the tooth itself into the investing tissues. The next important method by which the bones become diseased is, of course, thru the blood. The first *two* described routes, I believe are the most important of the three.

In discussing the first or periodental route we have,

- 1—Acute periodontitis
- 2—Chronic periodontitis
  - A. Subacute
  - B. Suppurative or pyorrheal
  - C. Alveolar osteitis

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\*Delivered October 22, 1930.

The above classification of Goadby is very good, I think, in describing infections in or at the gum attachment of that modified periosteal covering of the roots of the teeth. This covering is called the periodontal membrane and is attached to, and blended with the gum tissue at its outer side or mouth part, to the alveolar process forming the tooth sockets on its inner surface as well as to the cementum covering the dentine of the body of the root. The periodontal membrane or the *dento-alveolar periosteum* is the specially modified *periosteum* of the bone which has undergone changes thru development. The function of the membrane is to attach the teeth to the jaw bones. Thus, the membrane is traumatized considerably and is affected by neoplasms, rheumatic conditions, atrophic changes and hypertrophic changes in fevers. *Secondarily* the periodontal membrane may be infected by secondary infections in systemic disease by the spread of infective processes from the gums or teeth, and the spread of disease from the adjacent bony tissue.

The term *pyorrhea alveolaris* is improperly used and is often used to describe almost any gum infections. The term really means "a flow of pus" from the alveolus.

Some atrophic and non-suppurative infections of the dental periosteum and alveolar process occur that lead to the exfoliation of the teeth after their becoming loosened, without the aid of a purulent discharge from the alveolus. Secondary infections caused by microorganisms do occur, in these cases the teeth become loose and pus oozes from the alveolus. This is so-called "true *pyorrhea alveolaris*." We may have a simple catarrhal gingivitis or a necrotic gingivitis may cause an infection of the alveolar attachment that will simulate *pyorrhea*. A great deal of work has been done of late in the investigation of the diseased processes infecting the periodontal membrane in its entirety. Many names have been given to this condition, namely *suppurative periodontitis*, *pericementitis*, *alveolar osteitis* and *periodontoclasia*. All these terms are used to denote a *pyorrheal* condition. The term *perio-*

dontitis is a good one as it shows the tissues that are first attacked and their participation. Secondary infections of the surrounding structures commonly follow just as a periostitis may lead to an *osteitis* so a *periodontitis* may spread to the bony walls of the alveolus causing an *alveolar osteitis*. The etiology of periodontitis is different, at times, it may be caused by drugs that produce an infection at the gingival junction.

I feel that the term "pyorrhea alveolaris" should be used to denote the flow of pus from an alveolus, and the term periodontal disease used to describe a pathological condition of the periodontal membrane or periosteum of the tooth. Periodontitis may be acute, subacute or chronic. In any of the stages, pus may be present or absent. There may be an osteitis present.

Infections of the soft tissues that invade the free margins of the gums, called the gingivæ, are quite numerous and have been classified by many writers on this subject.

Pyorrhea alveolaris, which is sometimes called suppurative periodontitis, is closely associated with gingivitis, but it affects the periodontal membrane and its attachment and has a pathology and clinical symptoms that make it of special interest to the oral practitioner.

The word *Stomatitis* is used, as a rule, to describe an infection of the mouth as a whole, but it may have its origin in the free gum margin. An example of such an infection is Vincent's stomatitis which may invade the gums at their gingivæ and later spread throughout the buccal cavity.

Most cases of gingivitis spread to the underlying adjacent tissues and in the majority of instances have for their origin some form of organism. The atrophic and traumatic forms of gingivitis are not at first bacterial, but often become secondarily infectious. Necrotic, mycotic and probably the catarrhal types of gingivitis are of bacterial origin. The chronic forms of gingivitis including the hypertrophic, are probably due to the great variety of bacteria that are ever active in the mouth.

Traumatic gingivitis is often caused by the tooth brush, as most brushes are unclean and many are too stiff. The gums' margins recede and the denture becomes exposed and the teeth then become sensitive.

The gum margins are apt to be abraded in certain areas where the necks of the teeth are more prominent and are exposed to more injury in the brushing of the teeth. There is no pus present, as a rule, but the teeth appear to be eroded at their cervical margins and little smooth cups in the denture are usually seen. This condition is only found on the buccal or labial aspect of the gums and teeth.

There is an apparent atrophy or loss of gum tissue at the gingival margins. There may be a thickening of the interdental papillae, but the gum margin overlying the neck of the tooth is generally thin and quite pale in color. There are many other causes of traumatic gingivitis and we might mention in passing, those caused by fractures of the teeth and alveolar process, ill-fitting appliances, ligatures, tooth picks and other foreign bodies.

*Catarrhal gingivitis* may occur at any age, but is generally associated with a catarrhal condition of the mucous membranes of the upper air passages.

The mucous membranes of the gums and cheeks are generally swollen and shiny. Small *herpetic* patches may appear on the gums later. The gums are sore and the teeth feel loose and elongated. The gums do not, as a rule, bleed and they may appear anæmic altho, at times, edematous.

There is, as a rule, no evidence of suppuration, but there is a considerable amount of desquamation of the mucous membrane and gums and an accumulation of debris around the gum margins. The condition generally terminates upon the cessation of the catarrhal inflammation of the mucous membrane of the nasal passages and the throat.

The *Micrococcus catarrhalis* and *pneumoccus* are found.

Mild acid mouth washes are good and gentle swabbing to clean the teeth and gums is indicated. This form of



stomatitis is, as a rule, mild but may be, if neglected, forerunner of a so-called pyorrhea.

*Chronic gingivitis* is found in the unclean mouths of middle aged people. The gums are red and bleed easily.

There is no pus in evidence but much debris around the necks of the teeth. The condition is often not recognized at first, but is very chronic. The disease generally begins with soreness around the necks of the teeth. The gums may become ulcerative in four to five days and this condition spread to the mucous membrane of the cheeks. There occurs, at times, a yellowish slough and when this comes away, the gums are quite painful. The ulcerative surfaces are irregular and are healing and breaking down at intervals. There is apt to be a slight rise in temperature and diarrhea at times occurs. The breath is fetid. The entire surface of the gums may be affected but the attachment of the teeth is not impaired. The patient finds it very difficult to take solid food. The sub-mandibular glands may be swollen.

*Spirochaetes* are present at times, gram negative threads may be found. Sometimes a diplo-bacillus has been isolated.

The mouth and teeth should be thoroughly cleansed at frequent intervals. Mild mouth washes and cotton swabs should be used to remove gently the debris around the necks of the teeth. Fruit juices and light nourishing food should be given and the patient's general condition improved as much as possible. This condition is very apt to recur especially if the hygiene of the mouth is neglected.

#### HYPERTROPHIC GINGIVITIS

The chief characteristic of this form of stomatitis is the enlargement of the gingival flap or margins of the gums. It may be acute or chronic and it may be localized or spread to the entire gum covering of the bones. It may be confined to one or more teeth due to local crowns and bridges around the teeth. In the beginning only the gum tissue is

involved, but later on the alveolus may become affected. The gums often become infected during this condition and especially where the teeth are irregular.

The gums are swollen, congested and bleed easily. The attachment of the gums appears to be impaired but there is no discharge of pus, as a rule, from the gingival margins. Much debris collects around the teeth and gums including food, epithelial cells and mucus. The *Leptothrix racemosa* of Vicentini may be found in large numbers when a culture is examined. The swollen surface of the gum may be nodular, irregular and turgid in appearance. There is little pain. The extent of the condition generally depends upon the amount of the irritation. There is a fetid odor present. The condition generally corrects itself in children, but if not treated in the adult it may go on to *infection of the alveolus and eventually* loss of teeth.

The teeth should be carefully scaled and kept clean. All irregularities should be corrected and all irritations around the neck of the teeth should be eliminated. Sometimes the *hypertrophic* tissue should be removed either with a knife or cautery. Astringent mouth washes are, at times, useful. All systemic disorders should be treated at the time the local condition is being cared for. This form of gingivitis may become chronic and may be localized, general, circumscribed or diffuse.

#### ATROPHIC GINGIVITIS

A gradual shrinking or wasting away of the gingival tissue. This is due chiefly to the affection of the submucosa, and an atrophy of the gum as a whole. It is not, as a rule, caused by an injury.

The edges of the gums are pale and irregular, the contour of the gum appears fuller and thicker and the interdental papilla is thickened as the process of shrinking progresses, the gum attachment is greatly impaired and the alveolar process may become infected. The mucous membrane of the cheeks may be rather anæmic in appearance and the mouth is, as a rule, dryer than normal, due to an

impairment of the mucous glands. The alveolar process appears to be thinner than normal at times, and more translucent. This condition is more common in males than in females.

It is sometimes difficult to recognize this form of stomatitis during the onset of the disease. It may be mistaken for the simple traumatic variety of stomatitis. The absence of a purulent discharge and the lack of bleeding and congestion differentiates it from what we call pyorrhea alveolaris.

It is difficult to treat. Massage of the gums may help in giving the parts better circulation. When the cervical margins of the teeth become badly exposed, the attachment impaired, the teeth should be extracted. Great care should be given to the hygiene of the mouth.

#### MYCOTIC GINGIVITIS, THRUSH, WHITE MOUTH

There are large white areas on the gums sometimes simulating those of diphtheria. These are found on the tongue, buccal mucous membranes and the fauces. There may be a sweetish acid odor.

There is no pain, as a rule, but it may develop when the mucous membrane becomes abraided when the white patches are removed. It occurs in young infants and children under five years of age. It may affect adults in the terminal stages of some of the wasting diseases, notably tuberculosis. In children the onset is rapid and is often accompanied by gastro-intestinal disturbances.

The white layer on the gums is due to the growth of *Saccharomyces albicans*. There are found large numbers of yeast forms and mycelia. The disease is often caused by unclean feeding bottles and unhygienic conditions of the mouth in infants.

This disease responds quickly to treatment. A mild alkaline mouth wash and cotton swabs will generally render a cure. *Metabisulphite* of soda is a good specific. The mouth hygiene must be carefully noticed. This condition

may be mistaken for diphtheria and mercurial stomatitis at times.

### NECROTIC GINGIVITIS

(Vincent's angina, ulcerative stomatitis, trench mouth, gangrenous stomatitis).

This is a gingivitis beginning in the free margins of the gums. There is an acute necrotic inflammation which spreads rapidly buccally. This is generally associated with pain, foul breath and perhaps gastro-intestinal disturbances. The disease occurs often in childhood and may be a complication following *diphtheria*, *measles*, *scarlet fever*, *scurvy* and *perhaps dysentery*. There have been outbreaks of this disease in many of the armies in various campaigns. It was called "trench mouth" during the world war and affected many of our soldiers in France.

The disease spreads more rapidly in children than in adults. A sharp grayish white line of necrotic tissue appears along the gum margin. There may be a retraction of the gums away from the teeth and the gums bleed readily at the gingival margins. There is much pain at times, and it is difficult for the patient to eat or to brush the teeth. No membrane is formed, but there is, at times, a considerable amount of sloughing tissue. There may be a temperature of 100—103 degrees, associated with gastro-intestinal disturbances, a dirty tongue and a peculiar foul smelling breath. The ulceration has a tendency to heal in one place and break down in another. It may start around one tooth and spread to others. There may be glandular involvement. Many fusiform bacilli and spirochaetes are found in the ulcerative margins of the gums. The disease is closely connected with that of noma and in children there is always a danger of an extension of the infection into the deeper tissues.

A definite diagnosis can be made by means of a smear taken from the ulcerating surfaces. This disease may affect the tonsils, the fauces and the pharynx and the soft palate. It may start either in the gums or in the throat.

The treatment is local and general. The mouth condition can be cleaned up quite rapidly by means of Dakin's solution spray and by the application of Fowler's solution, powdered perborate of soda and chromic acid, applied by means of cotton swabs. Tooth extraction or other surgical procedures are contra-indicated during the active stage of this infection. Salvarsan intravenously has been used with good results. The condition is apt to recur if there are many gum pockets which cannot be kept clean, and if the teeth are very irregular. It is not exceptional to cure this condition apparently in ten days to two weeks and to have it recur a month to six months and even one to two years later, especially if the patient is careless in the hygiene of the mouth.

### NOMA, CANCRUM ORIS

This disease is a most rapidly spreading process of gangrene of the gums and cheek and invades the surrounding hard and soft tissues. Spirochætes and fusiform bacilli are found in great numbers.

It generally starts with a small ulcer on the side of the cheek. It appears first as gray-white slough and is generally accompanied by a small ulcerative patch on the gum margins. The early picture of this condition is much like a Vincent's angina and may arise in the throat and spread to the mouth. If the gray-white slough is removed, it leaves a raw bleeding surface that is very painful. There may be multiple ulcers but one side generally becomes hard and swells and goes on to necrosis and perforation. The lips and face may be greatly swollen also and at the same time the temperature rises to 101—103 with a very rapid pulse. As the ulceration spreads, large portions of the cheek and perhaps portions of the bone are thrown off leaving a deep-seated ulcer. Severe swelling of the glands follows and the patient may die from exhaustion and toxæmia.

The disease generally occurs in young children who have become greatly debilitated by infectious diseases or are

suffering from malnutrition. There does not appear to be sufficient evidence to say that this disease spreads from one child to another, but the child should be isolated from others.

The outcome in children is very bad; the death rate being high, it is most important to try to check the ulcerative process as soon as possible. Swabbing with dilute chromic acid and the internal administration of potassium chlorate, also iron is indicated. The intravenous injection of salvarsan seems to be of great benefit in certain cases. It is good practice to build up the patient as much as possible by a generous diet, cod liver oil, etc., and promoting good oral hygiene.

#### ALVEOLAR ABSCESS

Dental caries, or the decay of teeth affects the civilized races more than the savages. The teeth become destroyed by bacterial action upon fermentable food particles that become attached to the teeth. Organic acids, principally lactic, are produced after carbohydrate fermentation has taken place. The lactic acid formed attacks the lime salts constituent of the tooth which in the enamel is about 90 per cent of the entire substance. When the decay reaches the dentine of the tooth, the process travels faster as the dentine contains more organic matter in its matrix and is more soluble in organic acids. The dentine is gradually destroyed and bacterial products filter thru the canals in the dentine to the pulp chamber or to the nerve of the tooth. Here it may reach the blood stream. The pulp now becomes inflamed and undergoes suppuration, gases are formed and if the tooth is filled, the infection travels in the only direction it can, namely to the open end of the tooth, out thru the apical foramen. Thus a *dento-alveolar abscess* is formed as the tooth and the contiguous tissues are infected. The above pathological picture has been called a "gum boil" by the medical profession and laity in the past, but this term is now not recognized.

An alveolar abscess may be acute or chronic and in most cases, arises from a pulpless tooth. The cause is generally

a carious tooth but in some cases the pulp of a tooth that has no cavity may become non-vital by trauma, or shock caused by extreme heat or cold or constant irritation from a deep seated filling. Organisms may enter the pulp chamber from within the tooth or from without inwards; and death of the pulp follows. Bacteria and their products escape thru the apex of the tooth to the peridental membrane where a sac or granuloma is formed and inflammatory reaction takes place in the alveolus and the bone becomes involved. The alveolar plate may now become perforated and the abscess become sub-periosteal. If the process continues the abscess may strip up the periosteum covering the bone and may travel for some distance or rupture thru the gum near the seat of the primary cause of the trouble, namely the infected tooth. The acuteness of this condition depends greatly upon the virulence of the organisms present and the resistance of the patient.

The number of instances where the pulp becomes infected thru systemic blood infection, I think, are few. The lateral communications of the pulp thru the walls of the root to the peridental membrane as shown by Black and Howe, make it extremely difficult to ever really sterilize a root canal after it has become infected. Probably all pulpless teeth are, or become infected and perhaps the most important question now before the dental profession to decide is whether or not pulpless teeth should be retained or removed. According to Dr. Billings too many teeth are now being extracted. I rather feel that most infected teeth should be eliminated that cannot be rendered aseptic. A chronic alveolar abscess generally starts from an infected pulp, but it may arise from a peridental suppuration that enters the alveolus of a vital tooth. In this case the pulp in the tooth in the affected alveolus becomes non-vital quite early.

All the symptoms of inflammation are present in the acute stage of an alveolar abscess. The impaired function of the tooth is generally brought to the attention of the patient in no pleasant manner when the patient unwittingly

tingly bites on the tender tooth. The inflamed and swollen peridental membrane causes the tooth to be somewhat projected outward from the alveolus and the tooth is very painful to percussio. The radiograph may show an infected area around the apex if the process has continued long enough to have caused any changes in the structure of the bone.

The acute symptoms of the above may pass after the abscess has pointed and discharged thru a sinus, thus relieving the pressure on the tissues. The sinus, may after awhile, close up and disappear, leaving only a little scar or a thin watery discharge which may persist for months or years. The sinus generally leads to the apex of the infected tooth.

The bacterium found in an alveolar abscess of an apical origin is generally the *Streptococcus viridans* and a culture can best be obtained by the careful extraction of the infected tooth without allowing it to touch any of the tissues of the mouth or to become contaminated by saliva. Henrici and Hartzell have obtained cultures by trephining thru the alveolar process. This is a difficult procedure and one that is not satisfactory in most cases. *Alveolar abscesses resulting from periodontal infections* may show cultures containing the *Staphylococcus aureus* and other bacteria.

It is quite easy to recognize an acute alveolar abscess as a rule. There is generally present swelling and thickening of the tissues, the tooth is tender to percussion and there is generally considerable pain on the affected side of the mandible or maxillary bone. It is much more difficult to diagnose a chronic alveolar abscess, especially when the abscess has not "pointed" and is still deeply buried within the bone. Radiographic examination in the chronic cases is of great assistance and also the vitality test of the teeth in the region of the supposed infection. It is important to know at an early period whether the teeth are vital or non-vital as most alveolar abscesses are caused by pulpless teeth. In chronic cases the pain is felt mostly at



night when the patient is in the recumbent position. A slight rise in temperature may occur in either the acute or chronic stage and quite often the patient may, at times, feel chilly and generally uncomfortable. They cannot eat with comfort and their sleep is seldom uninterrupted. An alveolar abscess in the maxilla often infects the maxillary sinus and may cause also, a rarefying osteitis of the maxilla or mandible, which is often difficult to eliminate. Actinomycosis, mercurial stomatitis, phosphorus necrosis, specific lesions, and neoplasms may complicate at times, the diagnosis of an alveolar abscess. Therefore any swelling in and about any part of the jaw bones must be approached with great caution.

Neglected or improperly treated alveolar abscesses may cause the patient a great deal of discomfort and, at times, permanent deformity. For instance, an abscess may drain thru the tissues to the face or under the lower border of the mandible to the neck causing unsightly scars. An abscess in the region of the angle of the jaw may cause a very persistent trismus by infiltration into the masseter muscle. This condition may simulate tetanus. Infection into the blood stream is rare, but does occur and with fatal results at times. Acute edema and swelling of the tissues take place in connection with an alveolar abscess which at times is difficult to differentiate from Ludwig's angina. Abscesses of the upper jaw may drain into the palate and strip up the periosteum even to the attachment of the hard and soft palate. Tonsillitis, pharyngitis and other diseases of the naso-pharynx may result from prolonged dento-alveolar abscesses.

An acute abscess generally needs immediate surgery and as a rule, it is good practice to extract an infected pulpless tooth that is thought to be the cause and to secure immediate drainage. The old saying "wait till the swelling goes down before extraction" is, generally, a dangerous proceeding. If the abscess arises from a suppurative periodontal infection the question of extraction is not of an immediate nature as drainage may be obtained by opening the pockets

around the teeth and incision and drainage of the abscess itself. Careful radiographic examination should be made before any treatment is instituted if possible, so that the operator may know the exact condition of the teeth and bone enabling him to render intelligent and scientific treatment in the beginning of the trouble. In chronic cases, the infected teeth should be eliminated gradually depending upon the patient's general condition and local findings. If the abscess is draining freely, there is no special reason for immediate extraction and great care should be exercised in not removing too many infected teeth at one time. The possibility of producing a delayed but increased infection of the tissues that are of a low vitality must be considered. It is, at times, good practice to use an appropriate vaccine to raise the patient's general resistance before the removal of too many infected teeth is contemplated. The patient should be given a light nutritious diet and the bowels should be kept open. The patient should be kept at rest and the mouth as clean as possible.

Infections in the floor of the mouth and of the adjacent tissues of the neck are usually due to secondary infection from the throat or from some other part of the mouth and arise quite frequently from infected teeth. The infection travels through the lymphatics causing, at times, a serious lymphadenitis which may be acute or chronic. When the infection tends to spread directly thru the tissues a general cellulitis develops, as a rule, quite rapidly. An acute lymphadenitis may occur as a swelling in one or more lymph nodes, which swelling may disappear upon the removal or the quiescence of the initial focus, or it may progress to a larger area involving one or more nodes accompanied by rapid infiltration of the infection, *pain, and pain in swallowing, fever,* and subsequent suppuration. Recovery is usually uneventful after proper drainage has been established, provided that the surgeon has not delayed too long. Neglected cases will either rupture thru the skin or penetrate the deeper tissues and may even result in death. Treatment consists of an adequate incision and drainage and wet dressings of magnesium sulphate. In

chronic lymphadenitis resolution may be delayed in the non-suppurative form of the acute condition, and a chronic hyperplasia of the lymph nodes may take place. *Pyogenic* infection of the lymph nodes may be a predisposing factor of tuberculous adenitis, and the treatment is to remove all irritation and infection as soon as possible. If the enlargement of the lymph glands still persists after the removal of all apparent causes, and all systemic diseases have been eliminated from the picture, it is often good treatment to remove the diseased lymph nodes, if x-ray treatment does not give relief.

An *acute cellulitis* is characterized by a swelling of the cheek or floor of the mouth and occasionally in the side of the neck. The inflammatory process usually spreads rather rapidly and is accompanied by pain, fever and subsequent suppuration. The pain is most severe when the congested area breaks down and an acute abscess is formed. Early incision and drainage and the application of hot, wet packs to the part is indicated. If the swelling is above the mylohyoid muscle the incision can be made at times within the mouth, altho this procedure is not always successful. For any swelling of this character below the mylohyoid muscle, which can be felt under the mandible, external incision two fingers' breadth below the lower border of the mandible is indicated. It is well to insert a good sized soft rubber tube to keep the incision well opened.

*Chronic cellulitis* is a persistent, hard infiltration of the cellular tissue which resists all forms of treatment at times, and often lasts for months. It is more often located in the side of the neck. There is usually little or no suppuration and the systemic disturbances are very slight. The inflammation may subside after quite a period of time. Heat and electrotherapeutic methods seem to be of value in the treatment of this condition.

I would like to say a few words regarding that acute infection or cellulitis of the floor of the mouth known as *Ludwig's angina*. This infection is familiar to you all, but it is such a serious disease that I am sure you will not ob-

ject to my spending a few minutes in discussing some of its phases.

The condition is characterized by an *acute spreading infiltration* into the soft tissues of the floor of the mouth and neck, which often binds all the tissues involved into a hard boardlike mass. This infection is not very common, and is not always recognized when present but it often ends fatally when it does occur.

It starts, as a rule, in the sub-mandibular lymph glands of one side of the mouth, but occasionally it is bilateral. It is due most usually to a streptococcus infection that spreads rapidly to the lymphatic glands. Often a pure culture of the streptococcus may be found and less frequently the *Staphylococcus aureus*. The onset of the infection may result quite frequently from some injury or abrasion of the soft tissues within the mouth. I might say that in my experience it has developed as a sequela to dental or oral operations.

Thomas states that insignificant lesions in the mouth, infected teeth and tonsils are usually the primary foci leading to a lymphatic involvement. The initial swelling in the floor of the mouth or in the sub-mandibular lymph nodes may remain inactive for some days or weeks, but when it becomes acute the swelling spreads rapidly until within twelve to twenty-four hours the whole floor of the mouth and the anterior part of the neck is involved. The infection is deep seated and produces a very hard mass between the lower borders of the mandible. On account of the edema, the swelling is very sensitive and if the swelling extends toward the larynx there is often great difficulty in breathing and in swallowing. Within the month the induration may be felt in the floor of the mouth on one or both sides of the median line and the swelling may rise above the level of the teeth, forcing the tongue backward into the pharynx. At first the skin is pale and immovable and does not pit on pressure.

Constitutional disturbances are marked by a septic temperature, sweating, feeble pulse, general malaise and an

ashen color of the skin and worried or lack-luster facies. The infection usually develops into an abscess and there may be marked sloughing. Considerable *necrosis* of tissue may result. The disease may terminate in resolution, but this is rather rare. The prognosis is always grave. Of one hundred and six cases reported by Thomas, there were forty-three deaths. Among the complications are edema of the glottis, pneumonia and general sepsis. Blair states that death in from seven to twenty days is a frequent result in the untreated cases.

The chief point of diagnosis is the early intense progressive swelling involving the soft tissues having an extreme density. It simulates an exaggerated condition of a common adenitis. The treatment is free drainage, the tissues being opened widely and drainage tubes inserted and held in place often by means of a suture. Wet solutions of hypertonic solutions such as saturated solutions of magnesium sulphate or a 5 per cent solution of aluminum acetate are good. It is often good practice not to apply bandage over the dressing as the dressing should be changed very often, in some cases every hour or so and then again the bandage if applied, may interfere with drainage unless it is a very loose one. In making the incision great care should be exercised in not traumatizing the tissues, and the parts should be delicately dissected free until the infection is reached. Often very little, or no pus is obtained even by the most careful and extensive dissection. The character of the pus that is generally found in these infections is a thin dish water type. This occurs chiefly in the unfavorable cases.

Periostitis, osteitis, osteomyelitis and necrosis of the jaws are generally sequelæ to some form of dental or oral infection except when caused by syphilis or tuberculosis. Even in cases of lues and tuberculosis, the pyogenic bacteria ever present in the mouth play an important part.

Mercury, arsenic and phosphorus poisoning also in the past have contributed greatly to the above conditions.

either by their direct action or in lowering the resistance of the tissues to the bacteria of the mouth.

Local infections such as alveolar abscess, various forms of stomatitis and severe injuries are the chief causes, however, producing periostitis, osteomyelitis and necrosis of the jaws. In some cases of dento-alveolar abscesses, virulent pus under pressure may remain in the cancellous bone of the maxilla or mandible for some time before adequate drainage is established. I believe that most cases of osteomyelitis of the jaws have their beginning in cases where proper drainage has been delayed for some reason or other. When a virulent infection is well started in the cancellous bone it is difficult to treat the condition even by many incisions into the soft tissues; even tho all the offending teeth have been removed and good drainage has been established, the infection apparently runs its course and at times "watchful waiting" is about all the surgeon can do.

In children the infection in the bone spreads very rapidly thru the follicles of the erupting teeth and a great deal of damage is wrought in a very short space of time, especially if the child is suffering from a lowered resistance at the time. The infection is very inaccessible to treatment in the adult and in the child, but in the latter case the destruction of tissues is more rapid and the subsequent deformity is much more serious as the development of the jaws is greatly retarded by the infectious process. In many cases where a subperiosteal abscess is in process, early incision would relieve the pressure on the periosteum which in turn would prevent the stripping up of the periosteum that often causes death of bone. The use of local anesthesia introduced by means of the needle is contraindicated in most of these cases in making an incision obtaining drainage or in the extraction of teeth as there is grave danger of disseminating the infection further into the tissues. The use of gas-oxygen or ethylene as an anesthetic is to be preferred where infection is present.

Bone necrosis is generally the end result of periostitis, osteitis and osteomyelitis of the jaws. The process may be

molecular in character, the necrosed bone being thrown off in small particles or dead bone, en masse, may occur and a sequestrum of considerable size be formed. The sequestrum should be handled carefully and in no instance should it be removed until it has become entirely free from its periosteal attachment. There are quite a few cases on record where the entire mandible has been removed in one or two large sequestra after many months of patient waiting on the part of the surgeon who has done nothing more than to institute adequate incisions and drainage. The use of the curet in these cases is condemned by most surgeons. Regeneration of bone is much more apt to occur in the mandible than in the maxillæ after extensive necrosis of the above bones. In some instances the entire ramus including the condyle, coronoid process, sigmoid notch and the body of the bone to the symphysis has regenerated completely after exfoliation of the part.

Infections of the bone may be divided clinically into two stages, namely the acute fulminating stage and the more chronic stage where the sequestrum is likely to form. In the earlier stage of osteitis it is difficult, at times, to differentiate the above disease from the acute dental abscess as severe pain, swelling and a temperature accompany both conditions. There is a localized bone infection in all dento-alveolar abscesses. If the process persists, a more extensive area of bone becomes involved in spite of adequate incision and drainage and an osteomyelitis will then generally follow. In such a case the swelling extends along the bone in the vestibule of the mouth and the teeth become loosened and pus often discharges from the gingivæ of the gums. The pus also travels downward and externally subperiosteally and there is generally a swelling along the inferior border of the mandible. The swelling is apt to perforate the skin if early incisions are not made to relieve the tension of the pus under pressure.

Exposed bone may be seen or felt with a probe thru small sinuses in the gum that develop quite rapidly in some cases. Necrotic bone resulting from this process, at first, is firmly attached but may become loosened and thrown off

spontaneously in from six to eight weeks. The entire progress of the disease depends upon the virulence of the infection, the resistance of the patient to the infection and the type of treatment given. Some of these cases develop with amazing rapidity and a great amount of destruction is wrought especially in children whose resistance to dental infections is not good. Occasionally a pathological fracture of the mandible will take place, but the involucrum which forms generally acts as a splint and helps to preserve the continuity of the bone. In the acute cases the radiographic examination does not afford us much information as little change has taken place in the density of the osseous tissue. In the chronic stages, however, the x-ray is invaluable in telling us the extent of the involvement, new bone formation, condition of the teeth, etc.

In the treatment of all infections of the mouth it is of greatest importance that early incision and drainage be instituted. In acute bone infections the cause of the trouble is generally a pulpless tooth which should be removed as soon as possible, especially in children. The writer fully believes that every infected tooth in a child should be extracted long before it has had a chance to cause an involvement of the bone, whether the diseased tooth is a deciduous one or not. The question of saving infected teeth at this time should not be considered and I believe that in this the medical and dental professions are not in complete accord. Abscesses of the upper jaw can sometimes be drained adequately by incisions within the mouth, however, most abscesses in the mandible are best drained by free incisions externally under the lower border of the mandible. Diseased bone should never be removed until completely sequestered, as this procedure interferes greatly with the regeneration of bone and may cause distortion of the face, mal-occlusion of the teeth and non-union of the remaining portions of the bone and in children, lack of development of the jaws.

(A number of lantern slides were thrown on the screen to illustrate the clinical side of the diseases discussed by the speaker).



## BOOK REVIEWS

### MACCALLUM'S HALSTED\*

The fact that the first edition of this book is well nigh exhausted bespeaks its solid merit. Dr. MacCallum tells a plain, unvarnished tale, permitting his subject to be himself, without embellishment, and all whom Halsted honored with his friendship will agree that this is the man, as we knew him. The man, in this case, happened to be the most original surgical thinker this country has produced, the reviver of Hunterian or physiological (experimental) surgery, and, like Hunter, one of those heroes of our profession who ruined his health by scientific experimentation on himself. This happened in his youth, and the pity of it was that it turned a happy, likeable athlete, brimming with *joie de vivre*, into a cautious, reserved, reticent recluse of aristocratic mien, fertile in sardonic defensive reactions, meticulous as to the niceties of social contact, a master of sarcasm, his own severest critic, and when East winds were braw, no doubt, exceeding sad and sore at heart. Like Brahms, Halsted could make himself very disagreeable over "the foolish face of praise," masking a kindly nature under an ambiguous exterior, and with an unmistakeable strain of Scotch contrariness in his composition, remained, even in the married state, a bit of a bachelor. During an acquaintance of many years, I never heard him make the slightest casual reference to his own achievements, but there were jocund, convivial moments when the real man shone forth as a very royal sort, with no repining over the *quantum mutatus ab illo*. His wife, daughter of a Confederate officer who was killed in battle and of the witty Sally Baxter whom Thackeray so much admired,

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\**William Stewart Halsted, Surgeon*. By W. G. MacCullum, XVII, 241 pp., 18 pl., 1 ch. 8°. Baltimore, The Johns Hopkins Press, 1930.

appears as an archetypal Anglo-Saxon, all character, courage and common sense, with an immense humorous perception of the incongruities of human existence. She was devoted to her husband, yet writes to him as follows, addressing him as "Dear Wm.":

"I am glad that you are enjoying your French lessons. To me your disposal of your summers seems absurd. Instead of going away from stuffy, dirty cities where you have been living all winter you just go and immure yourself in another buggy place. If you must study French why can you not take it somewhere besides a large city. Still, I suppose it is the amusement you want and change, not particularly French. For I do not feel that what you have learned is of any use to you. . . . The ram is on its annual strike and I am travelling pretty steadily to keep it going just for a little until the new washers come. I started to instal the dam ram this A.M. but found a busted pipe as usual."

Halsted had his clothes made by "the best tailor in London," his shoes and shirts in Paris, where the latter were sent in batches to be laundered, and was so conscientious as to the details of a dinner party (ironing the table-cloth on the table and making the coffee himself) that Mrs. Halsted ultimately declined to have any more of them. She was an expert horsewoman, who wrote to her husband that "a person who does not ride never can understand how one who can ride does it as naturally as they breathe. You never understood either how crazy I always was to get out and away."

It was perhaps the obstinate Scotch strain in Halsted's make-up which made him original, catalyzing him to deeds of derring-do in fields not ordinarily essayed by American surgeons. Only an essential pathologist could make his achievement so understandable as does his present biographer. Halsted was the greatest modern master of perfect wound-healing, discovered and practised the principles of conduction and infiltration anæsthesia (1885), was the first to perform refusion (centripetal transfusion, 1884), to ligate the subclavian in its first portion (1891), to excise Vater's ampulla (1916) and did much for the physiology of the parathyroid gland by experimental auto- and iso-transplantations (1909), as also for the surgical treatment

of cancer of the breast (1889), and hernia (1889-93). Five months before his death, he demonstrated to the National Academy of Sciences that entire limbs can be transplanted without suturing the blood-vessels (1922). His other innovations, such as gutta percha and silver foil dressings (1880-96) or rubber gloves (1890), his experiments on the thyroid gland (1888) and his feats in the treatment of aortic aneurism (1905) and in intestinal surgery (bulk-head and blind-end anastomoses, 1910-20) are the kind of thing that every surgeon does *en passant*. To certain fundamental problems, neatly tabulated on pp. 237-239, Halsted recurred at intervals throughout his entire professional life. If, as MacCallum puts it, they remained "the same old problems," the phrase connotes the wisdom of limiting one's objectives and directives on a terrain beset with attractive by-paths which are sometimes delusive blind alleys. In surgery, Halsted was *tenax propositi*, using dilettante interests as his play-ground. So too, in a compact volume of maximum condensation-ratio, his biographer yet finds space and time for an occasional charming interlude, such as the paragraphs contrasting the simple social pleasures of old Baltimore with the changes after the fire of 1904, in consequence of which "you never see anyone you know except by arrangement." The prospective second edition will need only two things: more piquant letters from Sally Baxter and Caroline Halsted, and a serviceable index. There are eight portraits of Halsted, but the only good one of the later period is that opposite p. 178, which might well replace the impressionistic blur of the frontispiece. The volume is prefaced by a graceful and informing summary, written, as usual, at the last moment by Professor William H. Welch.

F. H. GARRISON.

## TWO NOTABLE SOURCE-BOOKS\*

These volumes present material which is indispensable for the historical study of two of the three basic disciplines which go to the making of the science and art of medicine. The first was designed as a pendant to Professor Long's *History of Pathology* (1928): the other will subserve the same end with reference to a *Primer of the History of Physiology* by Professor Fulton, just out (1931). It is obvious that these two disciplines, physiology and pathology, not only supplement each other but also cover material far more interesting, stimulating and informing to the student and the general practitioner than would be the case with a source-book of anatomy. One can fancy the weariful uphill progress of the Sisyphus who would essay the marginal references in the vest-pocket *Historia anatomiae* of Bauhinus (1597), the foot-notes in Sprengel and the multifarious citations available in the actual texts, from Galen to Leonardo, from Vesalius to Gray, Henle and Hyrthl, not to mention original discoveries published in 19th century periodicals. Such a compilation must needs be a stodgy, unreadable affair, if complete, and failing completeness, would be amateurish and valueless. The best of the early history of anatomy, moreover, is in the hand-drawings, as Choulant divined, and for the post-Vesalian texts, apart from the important philologic studies of Hyrthl, one might make a special case of the general equation of Goethe: *Die Geschichte der Anatomie ist die Anatomie selber*. With physiology and pathology, the case is different. We emerge from the dry statics of structure into the dynamics of function and deflected function and here we are best instructed and derive salutary stimulation from the higher reaches of endeavor, passing, Alpine-wise, from peak to peak. From England, incidentally, came two

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\**Selected Readings in Pathology from Hippocrates to Virchow*. Edited by Esmond R. Long. XIV (1 l.), 301 pp., 4 l., 25 pl. 8°, Springfield, Ill.; Baltimore, Md., Charles C. Thomas, 1930.

*Selected Readings in Physiology*. Edited by John Farquhar Fulton, Springfield, Ill., Baltimore, Md., Charles C. Thomas, 1930.

of the most inspiring books on the history of physiology—Sir Michael Foster's Denver lectures (1901) and Stirling's *Some Apostles of Physiology* (1902) and both are virtual source-books of epoch-making discoveries, inventions and experiments. A third source-book, the splendid contribution of Professor Neuburger (1897) tells us just why most of the physiology of the nervous system before the days of Galvani, Nobili and Matteucci had to be scrapped.

Professor Long's volume is, in the nature of things, illustrative, an anthology rather than a source-book, since most protocols of post-mortems, those of Bonetus or Boerhaave for instance, merely peg out additive data rather than epoch-making advances; and it is better to get the quaint literary flavor of Lancisi or Morgagni from such liberal citations as the editor gives than to bewilder the mind with the impossible yet essential alternative, the inclusion of the entire texts of these great contributions. In the history of pathology, as of anatomy, Tennyson's line is still apposite—

"Science moves but slowly, slowly, creeping on from point to point,"

the tempo being that of the sluggish fugue typifying "science" in Richard Strauss's *Zarathustra*. Professor Fulton, on the other hand occupies a terrain on which recent advances have been steady, step-wise and sometimes rapid, almost synchronous, in fact, with pace-making advances in physics and chemistry. With one or two singular exceptions, most of his excerpts are, therefore, basic and authoritative. The high spots in Long's book are Rhazes (small-pox), Saliceto (renal disease), Fernelius (renal calculus), Wepfer (apoplexy), Lancisi (fatal disorders of circulation), John Hunter (inflammation, syphilis), Hodgson (aneurysm), Laennec (phthisis), Bright (nephritis), Louis (typhoid fever), Hodgkin (lymphadenoma), Corrigan (aortic insufficiency), Cruveilhier (phlebitis), Andral (diseases of the blood), Rokitansky (congenital cardiac malformations), Addison (suprarenal disease) and Virchow (embolism, cellular pathology). Regrettable omissions are Paracelsus on gout, calculus and

goitre, the data of Vieussens and Lancisi on valvular disease of the heart, Bontius and Tulp on beri beri, Walter on peritonitis (1785), J. Z. Platner on tuberculous spine (1744), William Hunter on arterio-venous aneurysm (1757-62), Mestivier on appendicitis (1759), Whytt on meningitis (1788), Werlhof on purpura hæmorrhagica (1775), Wollaston on gout and calculus (1797) *et quibusdam aliis*, in lieu of material patently clinical or diagnostic. In Fulton, one misses the physiologic experiments of Vesalius, the remarkable contributions of La Place and Lagrange to the physiology of respiration, the experiments of Walæus and Stannius, Gaskell on the vagus nerve, Langley on the autonomic system, Kölliker on veratrinized muscle and the essential findings of Ludwig and Claude Bernard; while van't Hoff on osmosis and Arrhenius on the nature of solution are rather property of physical chemistry, and Captain Cook on scurvy is a phase of naval hygiene. Beyond this point, it seems ungracious to look such superlative gift-horses in the mouth. The wealth of illustrations and of facsimile reproductions of title-pages and texts gives to both volumes the charm of Stirling's "Apostles" and the later editions of Bayliss's Physiology. Over the page of the dedication of Professor Fulton's book, we read that "men choose art for the business of their lives, and labor at it alone and without pudding or praise, for the sake of these moments which have happened to other artists and may happen to them. And the world with all its indifference to art yet does value these moments and preserves with a religious awe the works in which they occur." Some of these moments of unique achievement have even happened to scientific men and there would be no harm in including more of them in subsequent editions of these volumes.

F. H. GARRISON.

## REMINISCENCES OF DR. S. WEIR MITCHELL\*

IRVING WILSON VOORHEES

For two decades preceding his death Doctor Mitchell was a living landmark during the summer season at Bar Harbor. The oldest inhabitants of Mt. Desert Island, and many of the younger inhabitants as well, still speak of him with tears in their eyes; for he was very generally beloved.

Since my college days he had always appealed to me in a double sense—as a brilliant author of fiction, and as an authority on neurology. Both of these fields attracted my growing mind so strongly that a choice between them was by no means easy, when considering my life work. This choice Doctor Mitchell helped me to make, quoting in support of his argument the well known aphorism, that “literature is a good staff but a poor crutch.” It was not difficult, therefore, to decide in favor of medicine.

Upon a beautiful morning in August, 1913, I was invited to spend some time with him in his library at Bar Harbor. When I entered he was sitting at his desk, surrounded by a pile of books and manuscripts. He had grown very deaf and did not hear my approach, so I stood for a moment near his chair admiring the massive head, covered with thick grey hair, while he kept on busily writing. Finally I stepped around where he might see me, and he arose quickly with a friendly greeting.

Out through the open window beyond the trellised porch and the green lawn shone the wonderful little harbor in the morning light, with its wealth of pleasure craft.

“What an ideal spot for study,” I said, “how much you must enjoy it here!”

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\*Read before the Section of Historical and Cultural Medicine, November 12, 1930.

"Well," he replied, "I used to enjoy it immensely but this season they have spoiled it all by bringing in the shrieking automobile. Our roads are being ruined by a crowd of undesirable holiday makers who flock here over week-ends and are driving the liverymen out of business." Then he asked me if as an ear specialist I knew of anything which might improve his hearing. He had just read of a new device described in the *Illustrated London News*, and he gave me a letter, received from the manufacturers in reply to his inquiry, asking me to look the matter up for him. This was done but we could not find that the apparatus had any value, and he was so advised.

Then I asked him how he had managed to produce such a large literary output when he was so constantly busied in his profession; for he was first of all a physician, literature being merely a hobby.

"Well, by keeping pretty studiously at it," he answered. "But you have always managed to keep up your medical work to such a high standard; how did you do that?"

"Yes, I have tried, but of course in these days I leave all the laborious work to my son, Doctor J. K. Mitchell, and I attend chiefly to consultation cases. Most of my literary work has been done during the summer here in Bar Harbor. It was undertaken at first as a kind of relief from idleness and I was rather surprised to find how well I could work up here."

"But you must be frequently interrupted," I said.

"Oh, well, that does not trouble me. I find no difficulty in taking up my writing just where I left off. Interruptions interfere with my thread of thought hardly at all. Besides, I often find out a good many things from people who are good enough to come and see me, and this leads me to ask a question: 'Do you know when the weathercock first came into use?'"

I had to admit that I did not.



"Well, I am sorry, for I have written a poem dealing with a certain date in history and my wife objects because she says my allusion to the weather vane is wrong, since it was invented long after the time I have made use of it." He laughed heartily at this and then the talk turned to his novels.

I told him that Doctor Henry van Dyke once said to me that he considered "Hugh Wynne" the great American novel.

"Yes," he said, "'Hugh' is pretty fair but my best is 'Constance Trescott.' In that book you will find the fullest report of a medical consultation in all literature."

Since this novel was written when Dr. Mitchell was seventy-five years of age, it is indeed curious that it is often regarded as his strongest work of fiction. I reminded him that of all his shorter stories I considered "The Autobiography of a Quack" his best.

"That interests me," he replied, "for I was more generally criticized for that story than for anything else I ever did. The Homeopaths in particular did not like it and many of them took it as a personal affront. I received scores of letters scolding me soundly for it."

We then walked over to his bookshelves and he showed me several of his favorite bindings, including gifts of volumes from literary contemporaries. When he took down a volume from his old friend Oliver Wendell Holmes, I told him how disappointed the entire medical profession was that he was unable to be present at the Holmes Centenary Celebration at the New York Academy of Medicine in 1909. As chairman of the committee appointed by the New York County Medical Society, it was my duty to arrange for a special meeting of the medical men of New York in commemoration of Holmes' birth. Knowing the close friendship which had existed between Mitchell and Holmes, I wrote asking Doctor Mitchell to be present and favor us with personal reminiscences of the Autocrat. He replied:

In Camp, Cascapedia Club, Grand Cascapedia,  
Quebec, Canada,  
June 19, 1909.

Dear Doctor Voorhees:

I have set myself resolutely to decline all engagements which would oblige me to leave Bar Harbor until the end of October and in November I am deeply pledged. Moreover, I have contributed to the lives and published letters of Holmes, all I had of interest; you see why I must decline your honoring invitation and believe me it is with regret.

Yours truly,

S. WEIR MITCHELL.

On the opposite page Doctor Mitchell, as a sort of balm for a possible wound, penned a paragraph which is one of the most delightful personal touches in my possession. It reads:

"As our paper is running out and I must save the last sheets for two or three letters which cannot wait, pray ask Doctor Houghton" (President of the New York County Medical Society at that time) "to consider this, with my apologies, as answering him.—S. W. M."

As the luncheon hour was approaching I turned to say goodbye. Putting his hand upon my shoulder, he said: "Well, my young friend, I am sorry you are leaving this beautiful spot so soon, but,"—in an almost quavering voice—"I may have to leave it myself before very long. Goodbye." As a matter of fact, he lived only about five months longer and this was the last time I ever saw him alive.

Doctor Mitchell, like all other famous men, had a remarkable personality. His magnetism was tremendous and everyone seemed anxious to shine in the reflected light of his presence. It was his custom to leave his beautiful home in Philadelphia about June first of each year and go on a fishing trip to Canada, usually to Cascapedia Bay. During the month of June salmon fishing is good in Canada and Doctor Mitchell was an expert fisherman. He took pride in sending a specimen of his catch to various friends, frequently enclosing a card, written in his own hand, stating the place of capture and the weight of the fish. Following this month or so of fishing, Doctor Mitchell went to his summer home, "Far Niente," at Bar Harbor,

where most of his reading and writing could be carried out undisturbed by professional duties. He was a great favorite in the summer colony, and was frequently called on to make speeches at the Temple of Art, where public exhibitions and "benefits" of various kinds were held, and not infrequently he was a guest of honor at one or other of the summer homes of the wealthy residents.

It is surprising what a vast amount of work he could turn off without apparent effort. Time for him seemed to have no limits, and, when in Philadelphia in attendance on patients at his office, he opened the door, he seemed to sense the errands of those in his reception room; for not only did patients foregather there, but also men and women distinguished in literary and other fields. He enjoyed his friends and was always annoyed if called out of the house when receiving them.

Doctor Mitchell was the third of nine children. He was named for Silas Weir, a prominent Philadelphian and friend of his father. As a student at the University of Pennsylvania in the class of 1848, his record was brilliant but he had to give up before graduating because of a threatened tuberculosis. Eighteen months of his long life were spent on beds of sickness, but in his latter days his health was excellent, almost exuberant, and he felt himself growing stronger and stronger every year.

He had certain peculiarities, one of which was his aversion to dinners and anniversaries. Another was his dislike of newspapers and reporters. He had little respect for what he called "newspaper English."

"To the reporter," he said, "a dinner is always a banquet, a fire a conflagration, an investigation a probe and any unusual welcome an ovation."

Ellis P. Oberholtzer, in his personal memories of Weir Mitchell, speaks of Doctor Mitchell's love of the Franklin Inn Club, where he spent many happy hours during his latter days. It was an absolute rule that affairs at the club be kept out of the newspapers and the annual dinner

was always a closed night. On one of these occasions the doings came to the knowledge of a reporter who published the "story" in a daily paper, to the great discomfiture of all the members, many of whom were prominent literary men.

"Do you wonder that I loathe the creatures?" said Doctor Mitchell.

The reporter wrote a letter of explanation, saying that the whole world was his prey and that he always got what he was sent out to get, regardless of the feelings of others.

"The ethics of a rag picker!" exclaimed Doctor Mitchell.

But, of course, Doctor Mitchell being very human could not be inattentive to what the newspapers said of him. He read their reviews of his books, although he paid little attention to criticisms unless they were unfair, then he would write, complaining of his treatment.

Doctor Mitchell volunteered for service in the great Civil War and had many unusual experiences. Describing the excitement upon the declaration of war and lack of preparedness, he said in an address delivered before the Physicians' Club of Chicago, February 25, 1913:

"The ancient guild of physicians alone remained an unbroken organization—the offspring of science and charity, faithful to a creed centuries old when Christ was born. In hospitals and on the field of battle where the surgeon ruled there was the truce of God, \* \* \* the wounded man ceased to be an enemy."

Even in those days physicians knew perfectly well that pneumonia and bronchitis did best in tents or out of doors, no matter how bad the weather, and in support of this fact, Doctor Mitchell wrote in 1872 a little paper on *Camp Cure*, also an article on *Hospital Gangrene*.

"It was found," he says, "that the injured men did badly in houses, better in barns and best of all in tents. \* \* \* A great many of us did not taste coffee for two or three years. Tea leaves, once used, were sold and greedily bought up.

How they were used again I do not know, but above all the other available waste material in value were egg shells. The fact is that the egg shell is a very pure form of carbonate of lime and when it is calcined and ground up it constitutes the base of all the finest face powders which the ladies employ."

The salvage was so successful that at the close of the war about \$80,000.00 was turned in from the hospitals to the Federal treasury, and the Surgeon General was allowed to use this money in the purchase of the great library of medicine now in Washington.

Describing the great conflict under fire, Doctor Mitchell speaks of Doctor John S. Billings, who operated back of Round Top at Gettysburg and was finally forced to retire under a rain of bullets. "In one case known to me," he says, "a man on the operating table was killed by a bullet while his wounds were being dressed. It was a noble test, of course; nothing, I think could be greater."

"One often reads in novels and sometimes in history of bayonet charges of cold steel. I never saw a bayonet wound, and of 25,000 wounds in Grant's battles, including the hand-to-hand struggle of the Bloody Angle, there were in all fourteen bayonet wounds. There were probably as many men severely kicked by mules." Apparently in the World War conditions were quite different, for the bayonet was one of the most dreadful of weapons.

Speaking of the value of women as nurses. "There were," he says, "women like the Schuylers, the Lowells and Miss Wormly, of whom I think with grateful remembrance. When we were in the neighborhood of great towns we had many volunteer women nurses. Some were terribly earnest, utterly ignorant and quite incapable of discipline. Others, if more efficient, were not punctual and came and went as they pleased. A large proportion were early credited in the papers for patriotic services and were seeking that notoriety which is the motive force of so many of the aspirations—and, shall I say, of the exasperations—of our own unrestful days."

Early in the war all captured surgeons and a detail of those who stayed with the wounded men were released, but in some cases there was needless detention for the sake of retaliation. In 1865 a General Order set free all imprisoned surgeons.

One of the curious experiences in war was the phenomenon of lost limbs—what Doctor Mitchell called “phantom limbs,” in which men who had lost an arm or a leg felt sensation as if the hand or foot were still present. “While this subject was occupying my mind,” said Doctor Mitchell, “a friend came in one evening and in our talk said, ‘How much of a man would have to be lost in order that he should lose any portion of his sense of individuality?’ This odd remark haunted me, and after he left I sat up most of the night manufacturing my first story, ‘The Case of George Dedlow,’ related by himself. In this tale my man had lost all four limbs. I left this tale in the hands of a delightful lady, now long dead, the sister of Horace Howard Furness. Then I forgot it. Doctor Furness, her father, much amused, sent it to Mr. Hale, Editor of the *Atlantic Monthly*. To my surprise I received, about three months afterwards, a proof and a welcome check for \$85.00—my first literary earnings and certainly not a contribution on my part, because I had nothing to do with the disposal of the paper and had not authorized its being put into print. This story has had a dreadful number of successors—the product of my lengthening summer leisure. The unfortunate George Dedlow’s sad account of himself proved so convincing that people raised money to help him and visited the Stump Hospital to see him. If I may judge it by one of its effects, George Dedlow must have seemed very real. At the close of my story he—a limbless torso—is carried to a spiritualist meeting, where the spirits call up his lost legs and he capers about for a glorious minute. The spiritualist journals seized on this as a new proof of the verity of their belief. Imagine that!”

Detailing further his war experiences, which are rather too harrowing for the perusal of the general reader, Doctor

Mitchell stated truthfully that "countless statues commemorate in Washington and elsewhere the popular heroes. Statues of generals are in every town, some of them memorials of men it were wiser to forget, some of whom history will judge severely. Every village has its statue to the private soldier. There is not a state or a national monument to a surgeon. At Gettysburg every battery site is marked with a recording tablet; every general who fell, Union or Confederate, is remembered in bronze or marble; but what of the surgeon who died? Nothing!"

Doctor Mitchell was in every sense a true and learned physician. He revered and respected the science and art of medicine, and strove in every way to extend its boundaries. It is not known to every one that he was an excellent poet as well as a gifted writer of beautiful prose. One of his poems entitled "The Goddess of Medicine" deserves quoting:

Fair heritress of every human hope,  
 Rich with the marvels of time's widening scope,  
 However high may rise thy soaring wing,  
 Whatever change thy fuller days may bring,  
 Our ancient lesson will be ever new;  
 That priceless lesson will be ever true;  
 Time did not teach it; time will change it not;  
 This, this shall last though all our lore's forgot,  
 To give what none can measure, none can weigh,  
 Simply to go where honor points the way;  
 To face unquestioning the fever's breath,  
 The hundred shadows of the vale of death;  
 To hear Christ's message through the battle's rage,  
 The yellow plague, the leper's island cage,  
 And with our noblest "well to understand  
 The poor man's call as only God's command."  
 Ay, under every century's changing sky,  
 Shall the Greek master's triple signal fly—  
 Faith, honor, duty—duty calmly done,  
 That shouts no self-praise o'er a victory won;  
 One bugle note our only battle call,  
 One single watchword, Duty—That is all.

## ANNOUNCEMENT OF AWARD OF ACADEMY MEDAL

Upon the recommendation of the Medal Committee and with the approval of the Council the Medal of The New York Academy of Medicine is awarded to David Marine, a Fellow of the Academy—physician, pathologist, teacher and scientist, who pursued a series of researches on the nature of the internal secretions, and in particular, on the thyroid gland; in finally demonstrating the relationship of iodine to the structure of the thyroid gland; whose researches have made possible the use of sodium iodide as a preventive of goitre, first applied to school children generally in the Middle West, and later as iodized salt in the goitre areas, particularly in the Middle West and Switzerland, with a most encouraging diminution in the amount of thyroid disease.



## EXTRACT FROM REPORT OF COMMITTEE ON PROFESSIONAL STANDARDS

A regular meeting of the Committee on Professional Standards was held on October 23, 1930. At this meeting Dr. Shirley W. Wynne asked permission to appear and be heard. This request was granted.

Dr. Wynne made a complete statement in regard to the use of the testimonial which he had authorized in the early summer of 1930. He also submitted documentary evidence which showed that he received no compensation for the use of this testimonial.

After some discussion Dr. Wynne was asked to submit a complete statement in writing which was subsequently received and given careful consideration at a second meeting of the Committee on Professional Standards, held on November 24th, 1930.

The Committee on Professional Standards reported to the Council on November 26th, 1930, the result of their deliberations in regard to Dr. Shirley W. Wynne. The Council approved the report and referred the report back to the Committee on Professional Standards for the preparation of a summary statement which might be published in the Bulletin. The Committee on Professional Standards report that the following is an accurate summary of Dr. Shirley W. Wynne's statement:

1. That advertising agents were habitually going too far in making extravagant and fraudulent claims in the field of dentifrices and cosmetics.

2. That the Bureau of Food and Drugs of the New York City Health Department was able to control such adver-

tisements only when the product advertised contained substances deleterious to health.

3. That the Federal Government had effected some improvement by requiring a change in wording but that deceptive wording remained.

4. That with the cooperation of some broadcasting stations, Dr. Wynne had been able to control certain advertisements on the radio.

5. That he had not found any method of controlling various toothpaste advertisements.

6. That the possibility of counter advertising had been suggested to him but he did not have control of funds to carry on an activity of this kind.

7. That it was suggested to him that by aiding recognized, commercial concerns which did not engage in extravagant or fraudulent advertising, he might exert a useful influence and a control on the character of the general advertising in that particular field.

8. That he had granted the use of a testimonial for the purpose just stated.

9. That the testimonial as first used pointed out the simple fact that a toothpaste was never more than a cleansing agent.

10. That a later testimonial stated that the particular toothpaste in question was a better cleansing agent than others which statement was based on evidence submitted to him by chemists in various laboratories.

11. That the testimonial given did not have the complete effect hoped for.

12. That the method was distasteful to him, and that he had granted the testimonial solely for the purpose of protecting the public.

13. That he received no emolument for the use of the testimonial.

14. That the use of the testimonial had been discontinued at his request.

15. That if a similar occasion again arose he would consult the Academy and would ask the Academy to co-operate with him in devising a method which would safeguard the health of the public from fraudulent advertising.

In the report of the Committee on Professional Standards to the Council at its meeting on November 26th, 1930, the Committee stated that it had inquired into the case of Dr. Shirley W. Wynne and that Dr. Wynne has discontinued the use of the testimonial. The Committee recommended to the Council that the same course be followed as was taken in similar cases, namely, that the Secretary of the Academy be instructed to write to Dr. Wynne advising him of the regulation of the Council pertaining to testimonials and that it is still the opinion of the Council that it is to the best interest of the medical profession for Fellows of the Academy not to grant testimonials in any form, shape or manner.

SAMUEL W. LAMBERT, *Chairman*,  
 EDWIN BEER  
 A. BENSON CANNON  
 ALFRED T. OSGOOD  
 WILLIAM B. PARSONS, JR.  
 BERNARD SAMUELS  
 ARTHUR M. WRIGHT  
 HARRY ARANOW  
 LEO KESSEL  
 JOHN A. HARTWELL  
 LINSLEY R. WILLIAMS

Report of Committee on Professional Standards for October, adopted at meeting of Council on November 26th, 1930.

The above extract approved by Council at its meeting on December 17th, 1930 and ordered printed in Academy Bulletin.

## LIBRARY NOTES

### DEATH OF THE REV. J. H. JUDSON

We regret to say that the Rev. J. H. Judson died on the fifth of December after a brief illness. He was born in 1852 on a farm in Oakland County, close to Pontiac, Michigan, and thus was seventy-nine years of age. He was educated at a country school, later at Pontiac and at the Academy of Knox College, Galesburg, Illinois, with one year at the College itself. After that he went through Hamilton College, Clinton, New York, and finally studied at the Union Seminary here. He graduated with the class of 1879. He determined to become a missionary, and before leaving for China, married Miss Filley of Windsor, Conn. She, one son (a doctor) and two daughters, survive him. The Presbyterian Board of Foreign Missions sent Mr. Judson out to Hangchow, and he spent forty-five years doing excellent work in China where he built up a small boarding school into the Hangchow Christian College and organized a trade school in connection with it. Last Christmas Mr. Judson wrote an interesting and amusing account of his life and work; with his characteristic humour he called it "From the Year One to Seventy-eight." He retired from mission work in 1923 and came to New York in 1925.

After years of work continued inactivity became irksome to Mr. Judson. We were looking for someone to occupy a position which was created by reason of our more spacious quarters in the new building. We are grateful to Mr. Felix Westrom for telling us of Mr. Judson. He came first of all as a full-time, but later, owing to decreasing bodily strength, as a half-time, worker on the staff of the Library.

Sitting at his desk at the portals of the Library his duties were to see that readers registered their names and also that on leaving they took with them only those books which they were entitled to. We had doubts whether this innovation could be brought about, but thanks to Mr. Judson's tact and good humour, Fellows and other readers soon fell into line. Many loved to chat with him when they passed his desk, on obtaining paper and pencils from him, or when paying for their telephone calls. All this was not enough for such an active man, and soon Mr. Judson began to open all the mail other than letters and to cut pages of magazines. Often he would come to one of us seeking more to do, so we would provide him with a game of solitaire, that of placing new catalogue cards in strict alphabetical order.

He never seemed to have grown up, and his work was done with a boyish enthusiasm yet combined with a stern sense of duty. His smile and his ways, his never flagging interest and cheerfulness soon endeared him to us all. And who will forget the preserved ginger or peppermints he gave us! He was never prouder than when he showed some friends of his old China days about the Library and introduced them to the staff. Through his good offices another retired missionary, the Rev. Dr. Hayes, shared his work for a year or more.

Mr. Judson's courage was remarkable, as for several years he knew that he might die at any moment, yet he quite rightly refused to give up, and kept at his work. Only a short time ago after one of his serious heart attacks he remarked with an eloquent gesture of his hand that he must "keep the even tenor of his way" avoiding unnecessary exertion, and when the Librarian seeing him start up with a bundle of books, made a similar sign, he would subside into his chair with a laugh. We all feel the better for his days with us and his example. No one has been more loyal or devoted to the Academy.

ARCHIBALD MALLOCH

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## GIFTS TO THE ACADEMY

### A LITTLE MEDICINE CASE

Miss Mildred Sawyer has very kindly given the Academy a small case for medicines. The box is of oak, veneered with mahogany (?), is bound and ornamented with wrought ironwork and has a small iron handle on top. It is a cube measuring six and five-eighths inches along each edge, except that the top shows a slight convexity from front to back. When the cover is lifted back, sixteen receptacles for bottles, four to a row, are seen, and only three of these are empty now. With the exception of a large drawer at the bottom which projects out almost to the front, the box is divided from side to side into two, the fore part being again divided from before backwards. Both quarters with space for four bottles, are hinged to the side of the box so that they can be made to swing out about a vertical axis like doors. Each quarter has below its group of bottles a tiny drawer which is concealed when the quarters are closed. The front of the large drawer, spoken of above, is also hidden when the case is closed; while the top of the drawer forms a little shelf on which to mix powders. When the case is open, two other shallow drawers are found in the back section. The lower one extends under the very back row of bottles (which are, comparatively speaking, large) and the upper one merely under the little cylindrical pewter pots which are found in the second last row. The cover is lined with paper decorated with a coat-of-arms in gold, red and black. The remains of a crown and shield supported by the remains of two eagles can be dimly seen. It might be the coat-of-arms of Austria, but the shield does not seem to be the same.

The little bottles have screw tops of pewter and show the punty (or pontil) mark on their bottoms where they were broken off from the glass-blower's iron rod. Only one of these bears a chemist's label, and this reads "Fougeron Pharmacien, Rue Bannier. N° 48 à Orléans." The bottle once contained oil of sweet almonds and were there any

left now we should probably anoint our leather bindings with it.

The names of some of the remedies sound strangely in our ears, "Eau Vulnérable" was obtained by distilling the flowers of sixteen plants. Those who are interested can find the method of preparation in Littré and Robin's *Dictionnaire de Médecine* (Paris, 1865). "Essence De Greofle," probably a mistake for "Essence de Gérofle," is nothing less or more than the (essential) oil of cloves. "Laudanum Liquide" of another bottle sometimes is qualified by the phrase "de Sydenham." Osler used to say: "Look what Sydenham owed to opium." We can add: "Look what France owed to Sydenham." "Eau de Fleur D'Oranges Double" has a generous sound. "Poudre Capitale" is still found in the cylindrical pewter receptacle. This was the same as "Pulvis Cephalicus" and in English was called a "Cephalic Powder." It contained the leaves of Asarabacca (hazelwort), Betony and Marjoram in equal parts and sometimes an equal amount of Muguet (mugget or lily-of-the-valley). The old English pharmacopoeias call it a "sternutatory"—please sneeze it as pronounced. We might refer to it as a snuff. The French also used the synonym, "Tabac Céphalique." The powder still retains a rather pleasant odour. Perhaps we should treat colds with it. In another little pewter pot with a screw top is some "Confection de Hyacinth."

"Theriacque," a still sticky, gummy mess of spicy odour, contained in another pewter pot, is, of course, theriac, one of the most famous remedies of all time. It is from the Greek word, theriaca, meaning wild or venomous beast, as it cured those who were bitten. The formula used for centuries was that found in the writings of Galen, and even Galen had it from the Greek verse of Nero's physician, Andromachus, or his son. So that particular form was known as Theriaca Andromachi or Venice Treacle, and was used for about 1800 years. One of the most notable theriacs contained one hundred and twenty-seven ingredients, while *T. diatessaron* or "Theriacque des Pauvres" had only five! Pliny took it that in devising such a complicated

compound, his contemporary Andromachus was simply trying to "show off." Old medical books used to speak of the "Four Officinal Capitals" which included Mithridatium (after King Mithridates VI of Pontus), its "improved" form Venice Treacle, Philonium, and Diascordium.

"Vinaigre des 4 Voleurs" is on the label of another bottle with pewter stopper. The vinegar of the four thieves has now dried up. It derived its name from the fact that this "vinaigre antiseptique" rendered four thieves immune to the disease when they robbed the bodies of victims of the plague at Marseilles in 1720-21. It was one of the liquids in the vinaigrette heads of canes which doctors carried and sniffed so vigorously when they entered the sick-room. Such canes were called pomander sticks.

In one of the small drawers is a piece of blue paper which is glued to the back edge of the drawer so that it forms a lining. In the centre of this lining is pasted a white paper label with printed ornamental borders and the words, "Orillard Apothicaire, A pithiviers." Pithiviers is a town north-east of Orleans. Printed by hand on the label are the words "Thé Hayswain." The second word makes one think of an Anglo-Saxon, perhaps of a doctor, and certainly of one who did not have a town practice. But evidently that is a guess in the dark, for Littré's medical dictionary describes a kind of green tea, which was highly thought of, called "thé heyswen" or "hyswen," but not to be found in the "Oxford English Dictionary." A *Medical Dictionary* by Robert James, London, 1743, 3 vols. (in which, by the way, Dr. Johnson had a hand) gives the name "Heysham" to the particular tea, and the idea of a surname bobs up again. This idea was further strengthened by the *Encyclopaedia Britannica*, 3rd ed. Edinburgh, 1797, which records the name as "Hyson," so called from the name of the merchant who first imported it. Then Robert John Thornton, in his *New Family Herbal*, London, 1810 (with illustrations engraved on wood by Thomas Bewick—think of that!) as the second variety of green teas, gives the names "Hy-tian, hikiong, hayssuen or hee-



chun—known to us by the name of hyson tea, named from an Indian merchant, who first sold tea to an European, his tea being asked for ever after.” More than ever this seemed to pin the name down to a definite person, for does not the *Herbal* tell us that he was an “Indian merchant?” Alas! to look in the “Oxford English Dictionary” suggested itself again, and we were robbed of the romantic picture which had been called up—only to substitute for it a finer fantasy. The word comes from the “Chinese *hsi-ch’un*, in Cantonese *hei-ch’un*, ‘bright spring,’ the name of coarse green tea.” So, for a time at least, the mystery of this word is solved.

Miss Sawyer wrote that she had been told that the little medicine case had belonged to a “Russian doctor named Alix who was Victor Hugo’s (1802-1885) physician . . . was sold at auction after the death of the doctor along with the remainder of his possessions and bought by an antique dealer in the Blv’d Raspail from whom I bought it.” Victor Hugo may have had a doctor called Alix, and there are a number of Frenchmen of that name dating from 1738 on in the dictionaries of biography. It is an interesting coincidence that just after the arrival of this gift, a catalogue of old medical instruments issued by Taeuber and Weil of Munich came to the Academy. In it is listed and illustrated exactly the same kind of a medicine case as ours, described as of German origin “about 1700” Pietro Capparoni of Rome wrote a paper on seventeenth and eighteenth century “portable pharmacies” (*Rivista di Storia delle Scienze Mediche e Naturali*, Siena, 1924, 3rd series, XV, No. 1-2, p. 29) and a similar case appears again! It had belonged to Cosimo III, Grand Duke of Tuscany (1642-1723). Finally, in his recent book, *Medicine in Virginia in the Seventeenth Century*, Richmond, 1930, Dr. Wyndham B. Blanton has two illustrations of a “seventeenth century medicine chest” exactly the same as ours except that the key has a different handle and along the back row, instead of bottles, there are four rectangular receptacles of block tin with rectangular metal tops. This case is in the Library of the Richmond Academy of Medi-

cine, Miller Collection. Dr. Blanton kindly writes that it was purchased from Taeuber and Weil, Munich, and it was thought to date from the latter half of the seventeenth century. "It is of Austrian make, having formerly belonged to a physician in ordinary to one of the Austrian emperors whose arms are in the embossed leather lining of the lid."

If the evidence is summed up, it might be fairly concluded that our case dates from the late seventeenth or early eighteenth century, and that two similar other ones we know of came from Germany or Austria. Ours is a very interesting specimen.

ARCHIBALD MALLOCH.

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### RECENT ACCESSIONS

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- Burks, B. S.; Jensen, D. W. and Terman, L. M. The promise of youth; follow-up studies of a thousand gifted children.  
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N. Y., Longmans, 1930, 527 p.
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N. Y., Commonwealth fund, 1930, 230 p.
- Osler, (Sir) W. The principles and practice of medicine. II. ed. revised  
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- Pearl, R. Introduction to medical biometry and statistics. 2. ed.  
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- Problems and methods of research in protozoölogy. Edited by R. Hegner  
and J. Andrews.  
N. Y., Macmillan, 1930, 532 p.
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Dresden, Steinkopff, 1930, 108 p.
- Savill, T. D. A system of clinical medicine. 8. ed.  
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Springfield, Ill., Thomas, 1930, 317 p.
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N. Y., Macmillan, 1930, 212 p.
- Studies on the diagnosis and nature of cancer, by various authors.  
Bristol, Wright, [1930], 240 p.
- Suter, A. B. W. Dentistry, a profession and a business.  
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- Swendiman, G. A. Dental health.  
Boston, Stratford, [1930], 121 p.
- Tate, F. G. H. Alcoholometry.  
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- Tobey, J. A. Riders of the plagues.  
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- Watson, J. B. Behaviorism. [Rev. ed.].  
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- Williams, J. W. Obstetrics. 6. ed.  
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- Winkler, H. K. A. Die Konversion der Gene, eine vererbungstheoretische  
Untersuchung.  
Jena, Fischer, 1930, 186 p.
-

# PROCEEDINGS OF ACADEMY MEETINGS

## DECEMBER STATED MEETINGS

Thursday Evening, December 4, at 8:30 o'clock

### THE THIRD HARVEY LECTURE

"The Peking Man"

G. ELLIOT SMITH

University College, London, England

ALFRED E. COHN, President Harvey Society

DATTON J. EDWARDS, Secretary Harvey Society

This lecture takes the place of the first Stated Meeting of the Academy for December.

Thursday Evening, December 18, at 8:30 o'clock

*Program presented in cooperation with the*

### SECTION OF ORTHOPEDIC SURGERY

#### ORDER

#### I. EXECUTIVE SESSION

ELECTION OF OFFICERS

ELECTION OF FELLOWS

#### II. PRESENTATION OF CASES

Cases of suppurative arthritis of the hip, Walker E. Swift

#### III. PAPER OF THE EVENING

Suppurative arthritis of the hip in children, Russell A. Hibbs

Discussion, Allen O. Whipple

### SECTION MEETINGS

#### SECTION OF DERMATOLOGY AND SYPHILOLOGY

Tuesday Evening, December 2, at 8:30 o'clock

#### ORDER

#### I. READING OF THE MINUTES

#### II. PRESENTATION OF CASES

a. Cases from New York University Dermatological Clinic

b. Miscellaneous cases

#### III. GENERAL DISCUSSION

#### IV. EXECUTIVE SESSION

JOINT MEETING OF THE SECTION OF SURGERY  
and the

#### SECTION OF LARYNGOLOGY AND RHINOLOGY

Friday Evening, December 5, at 8:30 o'clock

#### ORDER

#### I. READING OF THE MINUTES

#### II. SYMPOSIUM ON POST-OPERATIVE PULMONARY COMPLICATIONS

a. Oral prophylaxis, Sigmund W. A. Franken, D.D.S.

- b. Surgical aspect, George David Stewart
- c. Medical aspect, Henry T. Chickering
- d. Bronchoscopic aspect, John D. Kernan
- e. Roentgenographic aspect, Eric J. Ryan (by invitation)
- III. DISCUSSION. William R. Williams, Carl Eggers, Charles J. Imperatori

#### SECTION OF NEUROLOGY AND PSYCHIATRY

Tuesday Evening, December 9, at 8:30 o'clock

##### ORDER

- I. READING OF THE MINUTES
- II. CLINICAL PRESENTATION  
(from the Psychiatric Institute and Hospital) Patient with schizophrenia, illustrating problems of adjustment, Leland E. Hinsie
- III. PAPERS OF THE EVENING
  - a. Orientations of the training and practice in Neurology and Psychiatry, Adolf Meyer, Johns Hopkins University, Baltimore
  - b. Have psychological concepts a practical value in Neuropsychiatry? Edward A. Strecker, Jefferson Medical School, Philadelphia (by invitation)
 Discussion, Bernard Sachs, Smith Ely Jelliffe, J. Ramsay Hunt, Israel Strauss, Paul Schilder (by invitation), Mortimer W. Raynor
- IV. GENERAL DISCUSSION
- V. EXECUTIVE SESSION

#### SECTION OF PEDIATRICS

Thursday Evening, December 11, at 8:30 o'clock

##### ORDER

- I. PAPERS OF THE EVENING
  - a. A new symptom-complex: softness and deformity of the chest, Alfred F. Hess  
Discussion, Charles R. Stockard
  - b. Asymmetry of the face and head in infants and children, David Greene (by invitation)  
Discussion, Milo Hellman
  - c. Influence of intravenous vaccination with hemolytic streptococcus on the incidence of rheumatic fever in children, May G. Wilson  
Discussion, Oscar Schloss

#### SECTION OF OTOTOLOGY

Friday Evening, December 12, at 8:30 o'clock

##### ORDER

- I. READING OF MINUTES  
Program by the New York League for the Hard of Hearing, Inc.
- II. DEMONSTRATION OF LIP READING
  - a. Adult. Evelyn A. Parry, National Lip Reading Champion
  - b. Child. By children from the League's Educational Clinic. Demonstration conducted by Estelle E. Samuelson, in charge of the League's Educational Work

III. PAPERS OF THE EVENING

- a. Information and social service given by the League, Annetta W. Peck, Executive Secretary (by invitation)
- b. Otological research in the clinic, Edmund Prince Fowler, Director of Clinics and Research (by invitation)

Discussion, Thomas J. Harris, E. Ross Faulkner

IV. GENERAL DISCUSSION

V. EXECUTIVE SESSION

SECTION OF OPHTHALMOLOGY

Monday Evening, December 15, at 8:30 o'clock

ORDER

I. READING OF THE MINUTES

II. PRESENTATION OF CASES

- a. Recurrent epidermoid carcinoma (lantern slides), A. H. Cochran (by invitation), G. Allen Robinson
- b. A case of keratoconus with Muller's contact lenses (lantern slides), Olga Sitchevska (by invitation), Laurence D. Redway (by invitation)
- c. Thrombosis of central retinal vein, Thomas Curtin
- d. Embolism of central retinal artery, Thomas Curtin
- e. Case of juvenile glaucoma, Martin Cohen

III. PAPERS OF THE EVENING

- a. Puncture of the anterior chamber in glaucoma, Peter C. Kronfeld, University of Chicago (by invitation)
- b. Vitamin A in the retina, Arthur M. Yudkin
- c. The blue arcs of the retina and a probably allied blue after-image, Benjamin Friedman (by invitation)

IV. GENERAL DISCUSSION

V. EXECUTIVE SESSION

SECTION OF MEDICINE

Tuesday Evening, December 16, at 8:30 o'clock

ORDER

I. PAPERS OF THE EVENING

- a. An electrocardiographic study of the heart in lobar pneumonia, Arthur C. deGraff, Janet G. Travell (by invitation), J. Allen Yager (by invitation)
- b. Paravertebral alcohol injections for the relief of cardiac pain; a summary of experience to date and a report of nine cases, Robert L. Levy, Richmond L. Moore (by invitation)
- c. A further report on the incidence and prognosis of angina pectoris; a study of 500 cases, Paul D. White, Boston (by invitation)

II. DISCUSSION, Arthur M. Master, John Wykoff, B. S. Oppenheimer, Lewis A. Conner



SECTION OF GENITO-URINARY SURGERY

Wednesday Evening, December 17, at 8:30 o'clock

ORDER

- I. READING OF THE MINUTES
- II. PRESENTATION OF CASES  
Heminephrectomy for anomalous reduplication of pelvis and ureter, with lantern slide demonstrations, Samuel Lubash (by invitation)
- III. PAPER OF THE EVENING  
Notes on some present day surgical problems in urology, Homer G. Hamer, Indiana University School of Medicine, Indianapolis (by invitation)  
Discussion, Clarence G. Bandler, Howard S. Jeck, Clarence R. O'Crowley (by invitation), J. Sturdivant Read
- IV. GENERAL DISCUSSION
- V. EXECUTIVE SESSION

SECTION OF OBSTETRICS AND GYNECOLOGY

Tuesday Evening, December 23, at 8:30 o'clock

ORDER

- I. READING OF THE MINUTES
- II. PAPERS OF THE EVENING
  - a. The effect of the artificial menopause on systemic menstrual disturbances, James A. Corscaden
  - b. Is salpingitis a factor in the incidence of tubal pregnancy? Royal C. Van Etten, discussion, Maurice O. Magid
  - c. Trichomonas infection of the vagina (moving pictures), Joseph W. Draper (by invitation), discussion, Henry D. Furniss, Sophia J. Kleegman (by invitation)
  - d. Hydatid mole and chorion epithelioma with special reference to the Aschheim Zondek test, W. E. Studdiford (by invitation), Raphael Kurzrok (by invitation), Isador W. Kahn
  - e. Pernoxon as an analgesic in obstetrics and gynecology, Radford Brown, Howard Moloy, Marion Laird (all by invitation)
- III. GENERAL DISCUSSION
- IV. EXECUTIVE SESSION

SECTION OF LARYNGOLOGY AND RHINOLOGY

The regular December meeting was not held for the reason that the Section combined with the Section of Surgery in presenting a meeting on December 5.

NEW YORK ROENTGEN SOCIETY

*In affiliation with*

THE NEW YORK ACADEMY OF MEDICINE

Monday Evening, December 15

ORDER

- I. 8:30 p.m. to 9:00 p.m.  
Demonstration of interesting cases and roentgenograms

## II. PAPER OF THE EVENING

The value of the x-ray in the diagnosis of intracranial tumors, Merrill  
C. Sosman, Boston (by invitation)

## III. GENERAL DISCUSSION

To be opened by Charles A. Elsberg, -Charles W. Schwartz

## IV. EXECUTIVE SESSION

ROSS GOLDEN, President

J. BENNETT EDWARDS, Secretary

New York Meeting of the  
SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE  
*Under the auspices of*  
THE NEW YORK ACADEMY OF MEDICINE

Wednesday Evening, December 17, at 8:15 o'clock

- I. Electrocardiographic changes in pneumonia, A. M. Master, A. Romanoff
- II. a. Biochemical studies of human semen  
b. The action of semen on the human uterus, R. Kurzrok, C. C. Lieb
- III. Induction of tetany in rachitic rats by means of a normal diet, A. F. Hess, M. Weinstock, H. R. Benjamin, J. Gross
- IV. Fluctuations of the concentration of "blood sugar" in vitro, I. S. Kleiner
- V. Effect of posterior pituitary extracts on the lactic acid of the blood, H. E. Himwich, J. Fazikas
- VI. On the nature of the dye penetrating nitella from cresyl blue, M. Irwin
- VII. Value of hexuronic acid in the treatment of Graves' disease with suprarenal cortex, D. Marine, E. J. Baumann, B. Webster
- VIII. Fate of orally administered specific polysaccharide of pneumococcus, V. Ross
- IX. A practical method for concentrating chill free pneumococcus antibodies from sera without use of salt precipitations, E. J. Banzhaf, A. J. Klein

PEYTON ROUS, President

A. J. GOLDFORB, Secretary

THE NEW YORK PATHOLOGICAL SOCIETY  
*In affiliation with*  
THE NEW YORK ACADEMY OF MEDICINE

Wednesday Evening, December 17, at 8:30 o'clock

ORDER

## I. PAPERS OF THE EVENING

- a. Ruptured ovarian pregnancy, Arthur J. Lapovsky (by invitation), Boris Kwartin
- b. Injuries of the pons, B. M. Vance

- c. An evaluation of the erythrocyte sedimentation reaction as a routine diagnostic procedure in the general hospital, Helen Sinclair Pittman (by invitation)
- d. Albers-Schoenberg's disease; "marble bones," Nicholas M. Alter, M. C. Pease, A. G. DeSanctis (by invitation)

## II. EXECUTIVE SESSION

LEILA CHARLTON KNOX, President, St. Luke's Hospital

BERYL H. PAIGE, Secretary, The Babies' Hospital

## FELLOWS ELECTED JANUARY 7, 1931

Julian M. Freston.....	59 East 54th Street
Virginius B. Hirst.....	135 East 65th Street
Grant C. Madill.....	92 Caroline St., Ogdensburg, N. Y.
Charles W. Martin.....	1826 Cornaga Ave., Far Rockaway
Henry M. Moretsky.....	322 Central Park West
Edgar M. Pope.....	71 Park Avenue
Paul B. Sheldon.....	21 East 87th Street
Benjamin R. Shore.....	57 East 88th Street
Marion B. Sulzberger.....	200 West 59th Street
Clifford Lec Wilmoth.....	U. S. Marine Hospital, Staten Island

## OBITUARY OF ERNST FUCHS

ERNST FUCHS, born in Vienna, in 1851, died in that city after a brief illness of angina pectoris on November 21, 1930. He received his medical education in Vienna and was a special pupil of Brücke, Billroth and Arlt. After graduating in 1874 and acting as assistant to Arlt from 1876 to 1880, he became Professor of Ophthalmology, at Liège, at the early age of 29. In 1885 he returned to Vienna, to succeed Jaeger, and he remained as professor and director of the Eye Clinic, until 1916, when he retired because of the age-limit.

During these years the "Klinik Fuchs" became far-famed and the mecca of all young ophthalmologists; scarcely an oculist of importance in this generation but has profited and has been inspired by the teachings of this great scientist.

Fuchs was a most careful clinical observer and has given us the first description of many important conditions of the eye; he was just as painstaking a microscopist and has explained many pathological ocular lesions. He is probably best known for his text book on "Diseases of the Eye," which has been a classic in German, appearing in many editions and translations.

A great linguist, an enthusiastic Alpine tourist in his earlier years, his love of travelling brought him to most parts of the world. He has repeatedly come to this country where he had many friends and admirers. His last visit was in 1929 when he was one of the principal speakers at the

inauguration of the Wilmer Institute, at the Johns Hopkins Hospital; he subsequently received the Leslie Dana medal, at the St. Louis Meeting of the National Society for the Prevention of Blindness, and in New York was made an honorary Fellow of the Academy of Medicine.

A man of great simplicity of character, of great industry and with a remarkable interest in all subjects he not only made many valuable contributions to his specialty, but has helped and inspired a host of pupils who are scattered all over this world.

ARNOLD KNAPP.

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## DEATHS OF FELLOWS OF THE ACADEMY

FREDERICK MCKELVEY BELL, M.D., 815 Park Avenue, New York; graduated in medicine from Queen's University, Ontario, Canada, in 1903; elected a Fellow of the Academy March 1, 1928; died, January 6, 1931. Dr. Bell was a Fellow of the American Medical Association, a Fellow of the American College of Surgeons, a member of the County and State Medical Societies and Associate Gynecologist to Polyclinic Hospital.

CHARLES RAYEVSKY, M.D., Liberty, N. Y.; graduated in medicine from Bellevue Hospital Medical College, New York City, in 1896; elected a Fellow of the Academy February 1, 1912; died, December 22, 1930. Dr. Rayevsky was a Fellow of the American Medical Association, a member of the National Tuberculosis Association and the American Society for the Advancement of Science.

HAROLD ELMORE SANTEE, M.D., 135 East 65 Street, New York City; graduated in medicine from Cornell University Medical College, New York City, in 1908; elected a Fellow of the Academy February 3, 1921; died, December 26, 1930. Dr. Santee was a Fellow of the American Medical Association, a Fellow of the American College of Surgeons, a member of the Surgical Society, a member of the Alumni Society of Presbyterian and Lying-in Hospitals, Director of Surgery to Bellevue Hospital, Surgeon to Polyclinic Hospital and Consulting Surgeon to Mt. Vernon and North Country Hospital.

EDGAR STEINER THOMSON, M.D., 121 East 60 Street, New York; graduated in medicine from the University of Pennsylvania, in 1893; elected a Fellow of the Academy March 1, 1906; died, January 12, 1931. Dr. Thomson was a Fellow of the American Medical Association, a member of the County and State Medical Societies, a member of the American Ophthalmological Society, a member of the Ophthalmological Society. He was Surgeon and Pathologist to the Manhattan Eye, Ear and Throat Hospital, Consulting Ophthalmologist to Perth Amboy and Ossining Babies' Hospital, Englewood and Bronx Eye and Ear Infirmary.



# BULLETIN OF THE NEW YORK ACADEMY OF MEDICINE

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VOL. VII

FEBRUARY, 1931

No. 2

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## ANNUAL GRADUATE FORTNIGHT

### UPPER RESPIRATORY FOCAL INFECTIONS IN SOME OF THEIR REGIONAL AND GENERAL MANIFESTATIONS\*

JOHN EDMUND MACKENTY

Surgeon Director

Manhattan Eye, Ear & Throat Hospital

When Noah assembled the animals from the corners of the earth to be his guests on the first recorded yachting party, his consternation at the vast number of them must have been great. No less was mine when, assembling the literature on the subject of tonight's paper, I saw the small ark I had planned overwhelmed and sunk. So after wading through this outpouring of experience, good, bad and indifferent, I decided to set it all aside and build a rowboat (which metaphorically speaking is what my paper resembles tonight), rather than attempt anything as ambitious as an ark, and to put into it only personal impressions and experiences.

It is not an exaggeration to state that focal infection is assuming an ever increasing rôle of importance in the medical mind and practice and that the majority of focal infections are located in the paranasal sinuses, the tonsils and the teeth.

Time was, and that in my memory as an active worker in the profession, when only a few advanced thinkers and experimenters were groping towards the truths now established, visualizing a more simple and logical explanation

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\* Delivered October 22, 1930

of the then disconnected phenomena of focal infection diseases. "Humors in the blood," though a shrewd guess in the right direction, had grown old in service as an entirely satisfactory explanation and had ceased to satisfy these early scientific skeptics.

The workers in the field of diseases of the head and throat of thirty years ago were few, compared with now, and their standing in the profession at large not enviable. They were, in a way, the pariahs of the body medical, the small brothers of the big surgeons. Little did they dream then of the fertility of the unexplored domain they had inherited. I stood at the gateway of this promised land and can testify to the meagerness of the outlook.

That here above the shoulders of man was the roosting place of a thousand evils for him but few suspected. I well remember my own backsliding from general surgery into the quasi-specialty of rhinology, laryngology and otology. I was careful to conceal my recession from my professional friends. This specialty, with the big sounding name, hollow as the proverbial drum, was the abiding place of a considerable number of men who had, so to speak, fallen from the regular ranks (a sort of easy chair into which many middle aged medical men gravitated for rest from their labors). It was known as the easy specialty, which one as well as another could fill. Otology was in a little better case than rhinology and laryngology and could be better countenanced; for did it not have at least two finished and quite respectable procedures—mastoidectomy and the radical mastoid. But what could rhinology and laryngology show to compare with these? Only snipping and spraying, mostly spraying. A hide bound conservatism paralyzed effort or was it the seeming insolubility of the many problems at hand? I do know that for many years very little was attempted and that the experience of the general surgery of that day was neither utilized nor deemed applicable.

Pity and poorly veiled contempt greeted the student

whose attention was focused upon this seemingly barren and crystallized specialty of diseases of the nose and throat.

Now how changed the picture! Barren no more, but holding in its rapidly widening confines the causes of a goodly percentage of human ills. A great scientific renaissance is taking place in medicine and in surgery and not last in the advancing procession is rhinology and laryngology. It is another example of the last becoming first or one of the first. It cannot be denied that thirty years ago rhino-laryngology was the involuting end of the body medical, in other words, the tail.

I am here, gentlemen, to say a few words to you from the standpoint of a humble worker in the field of rhino-laryngology. Deep is the satisfaction I feel that now at last, after many vicissitudes, this specialty can stand before you on an equal footing with other specialties and without excuse for being, and that it is marching in line and contributing its share to the sum total of scientific knowledge.

I am of the opinion, from conversation with and reading articles by many of our medical and surgical brothers, that some of them at least are not as acutely cognizant, as they should be, of the uplift rhino-laryngology has given to the science of medicine in directing attention to and working out some of the problems in focal infections in the sinuses and tonsils in their regional and general aspects. Only a fractional part of the work accomplished in this vast field (and that but touched upon) can be embodied in a paper as short as this, of necessity, must be. In my own large volume of carefully worked out case records, I have irrefutable evidence of the malign influence of diseases of the sinuses, the tonsils, the teeth and the ear upon the body even in its remotest parts.

Beginning often in early childhood the insidious trail of chronic tonsillar and sinus disease may be traced through the lives of their victims. Lowered efficiency,



moral and physical degeneracy, chronic invalidism, and even an untimely end are too often the results. From a sociological standpoint the loss is incalculable.

I shall discuss only sinus and tonsillar conditions, omitting the ear and the teeth, and these only from clinical, personal experiences. Appended to this paper, but not read, will be a long list of extracts from a great variety of authorities viewing this subject from many aspects.

Acute sinusitis may precede the chronic form. In a review of thousands of case histories it is observed that the patient can usually give a definite date of onset characterized by acute symptoms. But not infrequently the onset is insidious, and may antedate in youth the patient's memory. We often receive the answer "I have always had it." Through the parents we may learn that symptoms were present in infancy progressing remittently or continuously to date. Summer remissions are the rule unless complicated by hay fever. Nasal allergy leads eventually to chronic sinusitis. Some writers contend that it is the other way about and that chronic sinusitis sets the stage for nasal allergy. It is my belief that the majority of chronic sinus victims are allergic or eventually become so, if in that term we include broken resistance to selected infections. In chronic toxic sinusitis we are often confronted with broken or lost immunity. It is toward the better understanding of this condition that our future efforts must be directed. Surgery, I think, has reached the apex of its accomplishments in this field, just as it has in that of cancer, and yet leaves much to be desired.

In this almost unexplored domain of immunity a brilliant and disease conquering future awaits the young men in our profession. I advisedly say young men since, in the shadow of advancing years, we older ones, though filled with ideas born of experience and though alluring roads to higher and more accurate knowledge may beckon to us, yet we hesitate to advance and can do no more than point the way. In retrospect we see how often fruitless

have been our long journeyings in the search of truth. Time enough, or courage or strength enough to blaze new trails are denied most of us, and we fain would shift the burden to younger shoulders.

This all important factor of immunity is too often disregarded in our blind confidence in surgery to stay the ravages of chronic sinus disease. In selected cases surgery does accomplish miracles, but there remains a great number in which mechanical intervention does great harm. This is reflected in the fear many patients evince at the mention of sinus surgery. So many of their acquaintances have been made worse by it.

I doubt if the profession in general realizes the widespread extent of this disease. Looking out through the narrow peep-hole of specialism it would seem to me to affect one quarter or more of the human family. And here may lie the danger of specialism. Perhaps we grow myopic from too constant and too intimate gazing in one direction. It is true that many individuals seem to carry the disease with impunity. One cannot but feel, however, that they would be even better without it.

Heredity, I believe, is a factor in sinus disease. In hundreds of instances I have observed sinusitis in every member of the family and occasionally in every member of two generations. Whether this can be accounted for by contiguity plus some specific and unknown infection or by an inherited lack of immunity must some day be determined. The latter view might explain its frequent appearance in infancy.

In later life influenza is the most potent causative factor. Sometimes it is acutely manifest during the acme of the influenzal attack, but often it creeps in during convalescence in an insidious way. Retarded recovery from influenza may be due to a frank, but more often to a concealed or latent, sinusitis.

Retention in the antra, with or without symptoms, is

far from rare. A slight mucoid postnasal discharge or a stuffy feeling in the head may be the only evidence present.

The posterior ethmoids and sphenoids may never spontaneously recover after an influenzal attack. A manifest sinusitis may follow, but usually it assumes a latent form. A slight ichorous, clear postnasal discharge, an irritated choanal, nasopharyngeal and pharyngeal mucous membrane, vague discomfort in the pharynx and nasopharynx, nasal stoppage during sleep, may be the forerunners of far reaching events: general debility, fatigability, lack of concentration, despondency, so called migraine, Sluder's sphenopalatine syndrome (lower half headache, uni- or bilateral, pain extending to shoulder and arm, erroneously diagnosed neuritis), arthritis, periartthritis and all the varied manifestations of toxic absorption. As the infection deepens the osseous walls of the sinuses may become involved with increasing, typical and often agonizing headache.

In a small percentage the optic nerve may be reached, causing optic neuritis going on rapidly to blindness if prompt and radical relief is not forthcoming. Intraocular changes, threatening vision and due to contiguous sinus infection, occur and produce a slow progressive degeneration. Here the indication for immediate surgery is less urgent than in optic neuritis. Local treatment is at times successful. Edgar Thomson, whose enormous experience in this field lends great weight to his observation, states: "Sinus diseases cause iritis, cyclitis, retinitis and choroiditis in almost as great frequency as they cause optic neuritis."

The feeling is growing among some oculists, and among those interested in the surgery of the paranasal sinuses, that in many of the chronic sinus cases a localized arteriosclerosis takes place. In retinal edema the view generally held is that it is due to a primary thrombosis of the retinal vessels. I would suggest that the retinal edema is primary and is a toxic manifestation. This later leads to a toxic

endarteritis and finally to a localized arteriosclerosis. I know clinically that in the chronic nasal cases there is sclerosed bone, sometimes of almost ivory hardness, and that hemorrhage in such cases during and after operations for sinns exenteration is sometimes very troublesome. The microscope reveals in this condition chronic arterial changes analogous to sclerosis.

In recent years, great interest has been evinced in and much effort expended on chronic arthritis. It would seem that this disease, like cancer, is on the increase and, just as in the latter disease, very little relief has been accomplished. The individual and social ravages of chronic arthritis need no telling. That it is in some mysterious way related to focal infection is my firm belief, but that focal infection explains the entire problem I do not believe. The sinnses have not been given the place they merit in the etiology of arthritis, being overshadowed by the tonsils and the teeth, and the intestinal tract. We know that chronic tonsillar disease of long standing almost invariably begets chronic sinnsitis, which may explain the failure to cure the various toxemias, especially arthritis, by tonsillectomy. Only part of the infection has been removed. Research has been slow to include sinnsitis in its family of toxic diseases or to give to it its merited place in the etiology of toxemia. Perhaps this is because sinnsitis has only recently been intensively investigated or at all understood.

I have considerable proof, in my own records, to offer in support of my contention that sinnsitis and arthritis are closely associated. Personal experience has proved this. A number of patients with arthritis of long standing have gotten entirely well and others have materially improved after a thorough and radical exenteration of diseased nasal sinnses. I am, moreover, of the opinion that greater success would crown our efforts were it not for the extreme difficulty incident to surgery in this well-nigh impossible field. My co-workers need no confirmation of this statement. I extend to them a sympathetic

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hand in the despair of complete accomplishment which is our common lot. I doubt if the profession at large realizes our difficulties or fully sympathizes with us in our often futile efforts.

Kindly permit me a digression to state that the twelve years I spent as a general surgeon were fraught with no such hazardous or technically difficult situations as have faced me in the surgery of the nose, throat and neck. I omit the ear. Its problems are better worked out and its surgery on a more open and visible plane than that of the rhinologist and laryngologist. When the surgeon removes the appendix, the uterine adnexa, the gall bladder, etc., he can feel quite confident that all the pathology has been cleared away. Not so with us. We now know that nothing short of the complete removal of an infection will cure it. One small remaining sinus cell—perhaps inaccessible to any kind of surgical approach—may suffice to keep in action the entire toxic syndrome. If the rhinologist could eradicate nasal sinus infections as completely as the otologist and general surgeon can clean up their respective infected fields, we would be able to show some remarkable results in the cure of diseases of toxic focal origin. As I said before surgery has almost extended itself. After a long and uncertain voyage we, who are interested in focal diseases, have sighted land, but are now eagerly looking for the immunologist to pilot us in.

Chronic sinusitis may affect its victim in a local or a general way but usually in both ways. For a time somatic resistance may withstand but eventually, perhaps after some special strain or period of illness, this resistance fails. A very large percentage of chronic headache and of so-called migraine is due to sinusitis, located usually in the posterior ethmoid and sphenoid areas. A careful study of the pain symptom is essential and leads conclusively to a differentiation of sinus headache from that due to other causes. I have seen acute sphenoiditis with retention cause the most agonizing headache with delirium, severe general reaction and a suspicion of meningitis.

I shall omit a detailed description of the various acute and chronic suppurative conditions in the sinuses which may involve contiguous tissues. You are, I am sure, well acquainted with the orbital fossa infections, occurring in children from acute ethmoiditis. I would warn against too early and too radical surgery in this disease. Usually the infection subsides. When phlegmon occurs it is safer to let it reach the surface than to invade the orbit deeply in search of it. Frontal sinus perforation in adults is more serious and may result in osteomyelitis, local or spreading, frontal lobe abscess or meningitis. Considering the number of sinus cases, it is remarkable how infrequent is the incidence of meningitis. Meningitis is more prone to start from posterior sinusitis but even here it is rare considering the great prevalence of both the acute and chronic types.

Another word on ocular involvement. A frank and purulent sinusitis rarely causes ocular involvement. Nor is this purulent type always the most toxic, in a general sense. The occult or concealed type, with very little evident discharge, is in a regional and general sense more serious. The reason is inherent in the pathological processes active in these clinically distinct forms of sinus disease. In chronic purulent sinusitis we find a thickened mucous membrane lining the sinuses, with a fibrotic basement membrane. The bone is usually intact. In other words, the infection is, to a large extent, walled off from the blood and lymphatic circulation. In the occult or concealed form the mucous lining is but slightly thickened, there is very little protective thickening of the basement membrane. The blood and lymph circulation is active and wide open and a low grade chronic osteitis is usually present. Here we have all the conditions favorable to a local or a systemic invasion, and it is here that we may expect ocular involvement and general toxic absorption. Here again the X-ray evidence is negative unless aided by too vivid an imagination. The patient may complain of post-pharyngeal discomfort, postnasal mucoid discharge, re-



current head colds and intermittent nasal stoppage on the affected side. A careless history and a casual examination passes these patients up as normal, but careful inspection reveals inflammatory changes in the pharynx, nasopharynx and choanæ. Toxic symptoms are often present. The visual apparatus may become involved by direct extension as in optic neuritis or indirectly through the blood and lymph channels as in retinitis, uveitis, etc. The exact manner in which the infection reaches the eye is still controversial. It is probable that the toxins and not the bacteria are carried to the vulnerable point. In joint involvement this theory is accepted by many of the investigators.

A large mass of clinical evidence convinces me that the toxic foci in the tonsils, sinuses and teeth are more potent in their somatic manifestations than foci of infection elsewhere. Pelvic foci in women are very common yet it is exceptional that constitutional symptoms appear. The same is true of seminal vesicle disease. A chronic appendix may have a malign influence on the intestinal canal, especially in producing colonic stasis. Autopsies reveal the frequency of cholelithiasis, yet it is only in exceptional cases that this extends its influence beyond local bounds.

Clinically we have ample proof of the relationship between sinus and tonsillar diseases and eye involvement and we are firmly convinced of the beneficent effects of timely and properly done surgery in this situation. A very bitter controversy is centered around this question, some even going so far as to deny entirely the benefits from surgery. An internationally known neurological surgeon is the champion of these doubters. His acrimonious and scorching denunciation of us so-called radicals would singe our enthusiasm had we not a mass of incontrovertible evidence to sustain our position. Our opponents point to our mistakes where nasal surgery failed to influence the blindness from some intracranial cause, but they are mostly silent on the many almost miraculous cures following operation in sinus disease blindness. All workers in this

field are aware of the extreme difficulty in disassociating intracranial and intranasal blindness, especially if sinusitis is present and if the eye changes are incipient and unilateral.

We all make mistakes. The adage of the glass house applies here. Not so long ago an acquaintance of mine was told by a well known brain surgeon that he had a brain tumor. Suicide followed. The autopsy on the brain was negative. On the advice of two leading oculists a few years ago, I operated a woman with progressive unilateral blindness and sinusitis. No improvement followed. One year later the patient died suddenly and the autopsy revealed an aneurism of the circle of Willis. Last year I operated eleven patients for blindness. Ten of them promptly recovered normal or nearly normal vision. One, an advanced case of intraocular degeneration, improved a little. Nine months later one of the recovered cases, whose vision in one eye had been down to a perception of light for a long period, and in the other eye 20/200 for a few months, relapsed to some extent. The neurologist now states that she has multiple sclerosis. We are wondering why her vision became normal for nine months, and this brings up the question "Does sinus toxemia bear any etiological relationship to multiple sclerosis?"

The lack of uniformity in the results in our attempted elimination of focal infection has brought about much controversy. The criticism from the onlooker is that if our premises are sound the results should always agree. This confusion is due to several causes. First. Lack of anatomical uniformity in the sinus fields. Second. The extreme difficulties to be overcome in surgery on the sinuses even in the most experienced hands. Third. The unwillingness on the part of some to accept the tenets of the radical faith. All surgical procedures have had to run the gauntlet of conservatism (for example mastoidectomy, tonsillectomy, the various operations for cancer) before they reached the safe harbor of radicalism. My conviction is, if surgical interference in nasal sinuses

disease is elected, it should be radical and that every cell left behind is a potential cause of trouble. This same foolish controversy raged for years on mastoid and on tonsillar surgery. Even in the surgery of cancer there are conservatives, paradoxical as it may seem. As though one could be too radical in cancer!

When we widen our field of research along the malign trail of sinus and tonsillar infections, we enter the domain of medicine and surgery. Here is a vast subject for out-reaching my time allotment. I can but point a clinical finger here and there. The gastrointestinal tract from end to end may feel the effects of a long continued sinus and tonsil infection, both directly from the infected material swallowed and indirectly through the blood stream. It would seem that the former opens the way for the latter by reducing local tissue resistance. We may have as a consequence chronic gastritis, gastric and duodenal ulcer, cholecystitis, cholangitis, pancreatitis, infected Peyer's patches, appendicitis, cecal spasm, colitis and proctitis. In my experience there are many instances of entire cessation of abdominal symptoms after the elimination of upper air passage infections.

In recent years the lung specialists are recognizing the intimate connection between lung conditions and sinus diseases with a resultant reclassification of lung pathology on a causative basis. In so-called chronic tuberculosis, with negative sputum, chronic fibroid phthisis, chronic bronchitis, dilated bronchi, bronchiectasis, chronic pneumonitis, etc. the basic cause is often traced to a chronic sinusitis, perhaps existent since childhood which may be entirely overlooked for many years by both patient and doctor. We have often seen a chronic antrum produce the clinical picture of a rapidly advancing T.B. Cough, emaciation, night sweats, rise of temperature, debility, etc. were all present. If there is added to these vomiting we should be led to suspect a chronic antrum disease.

A few years ago such a case was brought to me from the

West where he had been in a sanatorium for tuberculosis. The emaciation was extreme, the vomiting incessant and the cough prevented practically all sleep. From the moment both antra were drained all symptoms ceased. Miraculous seem some of these cures when the causative factor in the paranasal sinuses is eliminated. Even the advanced bronchiectatic patients may get a small but grateful degree of relief.

Selected types of asthma yield to intranasal surgery. I have seen several asthmatic patients, bed fast with profound toxemia, chronic temperature, tachycardia, severe spasmodic cough, emaciation, anemia and every evidence that a lethal termination was not far off, yield to radical external exenteration of diseased sinuses. These patients have usually undergone many intranasal efforts at relief. In one, twelve such attempts had been made without avail since all had failed to reach the frontals and extensive superior orbital ethmoids, which were packed with pathological infected tissue. Here I would express a warning. Since asthma is in the little known domain of anaphylaxis, our expressions of prognostic acumen should be curbed and we should consider well the factors in each patient before subjecting him, through too enthusiastic surgery, to what may prove to be fruitless misery.

Incipient cardiovascular degeneration has, in my experience, yielded to the elimination of sinns and tonsillar diseases, especially in the young. In the old or advanced cases little can be expected.

Chronic laryngitis and some of the benign laryngeal neoplasms are rarely primary in the larynx but appear as expressions of infection either from above or below. And since chronic laryngitis and other benign pathological conditions in the larynx are frequently the precursors of cancer of the larynx, it may be assumed that upper air passage diseases may be indirectly causative of this most dreaded of all throat maladies. It has always struck me as interesting that cancer of the larynx is so often as-

sociated with foul mouth conditions, infected, decayed and pyorrheal teeth.

Deafness in children is so often associated with infection in the sinuses and particularly in the antra that in all cases this possibility should be eliminated. My records show numerous cures of deafness in the young from antral drainage. In one instance the deafness cleared up entirely after antral drainage only to reappear when the antral openings closed. After repeated efforts to maintain these openings and, though always loath to do any extensive surgery on the sinuses of children, I was obliged to open both antra radically to save the hearing.

Perhaps I have been too prolix on the subject of nasal sinus disease, but my excuse is a belief that the sinuses are less in the medical mind as a cause of general infection than their accomplice in crime, the tonsil.

The rôle of diseased tonsils as a cause of systemic disease is too well known to you to justify a lengthy discussion of the subject. It is no longer controversial that a very small tonsillar remain (sometimes so small as to be visible only during an acute flare-up) may be more lethal than the entire gland. The lymphoid tissue, extending downward from the inferior tonsillar pole on the lateral pharyngeal wall, is too often not removed due to difficulty of access, to danger of hemorrhage or to a belief, on the surgeon's part, that it is innocuous. Any tonsillar remain usually becomes buried in the healing process. If a septic explosion occurs in this displaced fragment the neck may be invaded at once or the inflammation may extend down the lateral pharyngeal wall to the larynx, causing laryngeal edema. These tonsillar fragments, even when not acutely active, may give rise to a long chain of toxic symptoms often attributed to other causes. The slogan in tonsil removal should be "All or Nothing." Since 1927 I have seen six deaths from acute tonsillar infection invading the neck, besides several others in the past thirty years, not to mention many narrow escapes.

Tonsillar infection is often the cause of chronic sinus disease. This relationship is so intimate that little help for chronic sinusitis is to be expected if the offending tonsils are allowed to remain. I have hundreds of records to prove this statement, cases where the sinuses have been exenterated in vain until the tonsils were removed. In our endeavor to rid the upper air passages of infection, the rule should be remove the diseased tonsils first, since it has been noticed, when diseased tonsils are present, that a fulminating tonsillitis may supervene upon any, even the most simple, intranasal surgical procedure. Ignorance of this rule has caused in my earlier experiences many painful situations. Therefore, sinus operations should never be attempted in the presence of diseased tonsils. I can recall two instances of malignant endocarditis due to ignorance of this rule.

Profound secondary anemias have yielded to tonsil removal. In my records are three cases in which prior to tonsillectomy repeated transfusions had failed to combat the recurring anemia.

Nephritis, in its various forms and stages, may be entirely due to infected tonsils. I have observed cardiovascular disease improve materially after tonsillectomy, but have never seen it cured when well established by the removal of any focal infection.

Sometimes marked is the change witnessed in the functions of the abdominal viscera after tonsillectomy. Gastric and duodenal ulcers heal, gall colic attacks cease, cecal pain and tenderness subside and colonic stasis disappears. This may be due to a general systemic uplift but other considerable factors are the elimination of the direct infection through the swallowing of bacteria and the indirect action of toxins through the blood stream.

I would like to emphasize the intimate relationship existing between thyroid disease and infected tonsils. Years ago, before we were alive to the rôle of focal infection in this regard, I observed that some of my thyroidecto-

mized patients failed to respond to the operation until their diseased tonsils were removed. Since then I have often noted the association of diseased tonsils and Graves' disease and have witnessed in many cases marked improvement after tonsillectomy. That acute tonsillitis may cause acute thyroïditis I have ample proof, there being eight such instances in my records. Two of them went on to suppuration and to surgical drainage.

Intraocular inflammations and degenerations are less commonly due to the tonsils than to the nasal sinuses. If here tonsillectomy fails to give relief when a focus is suspected, the sinuses should be scrutinized since, as we stated above, these two robbers of health and happiness are often closely associated.

Attacks of recurrent acidosis in children, at times alarming in their intensity, pyelitis, both in children and in adults, may be due to infected tonsils and, in my experience, have frequently been cured by tonsillectomy.

Dermatology is recognizing more and more the importance of focal infection. Just as in syphilis and in the exanthemata, the skin lesion is known to be only the outcropping of an inward malady. So many skin lesions, hitherto considered local, are now suspected of having their inception remote from the surface. I have witnessed many cures of eczema and acne through the ablation of foci of infection in the sinuses and tonsils, notably in the former. One striking instance occurred in a man of thirty with an extensive generalized eczema existing since his second year. An intranasal radical operation on a chronic purulent pansinusitis entirely cured the disease.

Obstetricians are inclining to the belief, backed by considerable clinical experience, that the toxic vomiting of pregnancy is in some way related, directly or indirectly, to toxic focal disease. One specialist in this field, whose experience has been unusually large, stated to me that since medicine and surgery had been active in the elimination of toxic foci, eclampsia had been greatly reduced.

To enter into all the details of the innumerable and devious ways by which the focal infections under discussion reach and affect the near and remote body tissues would extend this paper into many volumes. I shall conclude this very incomplete recital by mentioning a few more of the common diseases in which a close association with focal infections has been well established.

- (1) Acute articular rheumatism
- (2) Acute cervical infections by the lymphatic route or directly into the muscular planes
- (3) Septic jugular thrombosis
- (4) Laryngeal edema and infections, chronic and acute
- (5) Retropharyngeal abscess
- (6) Acute septic parotitis
- (7) Neuralgias and neuritis—notably facial, orbital and cervical. The pain in the back of the neck from diseased tonsils is well known. Sciatica, myalgias, nerve deafness.
- (8) Mental depression profound at times to the point of insanity and suicide. Mental depression is a characteristic feature of chronic nasal sinusitis. In the toxic cases it is always present in varying degree.
- (9) Recurrent toxic attacks of undetermined cause.
- (10) Partial or complete loss of immunity to bacterial infections, especially in the nasal and throat manifestations. Associated with this we find undue constitutional reaction to the toxins of these infections. The victims of lost immunity are derelicts on life's sea. In travelling one meets them everywhere, always seeking but rarely finding relief from their manifold ills. Some of them I have succeeded in restoring to a fair degree of resistance by eliminating as far as possible, through surgery, their foci and then keeping them in the southwest Rockies for from two to four years.
- (11) T. B. cervical adenitis
- (12) It is a question if Hodgkin's disease does not have its inception in the tonsils.



(13) Acute bronchopneumonia from sinus infection and more rarely from tonsillar infections.

(14) Hay fever. It is believed by some observers that sinus disease sets the stage for hay fever. I know the reverse of this to be true. Very few hay fever victims escape chronic sinus disease.

Herpes and other skin lesions of a similar nature, pointing to disturbance of the spinal root ganglia, are of toxic focal origin.

I am sure that, in listening to the incomplete and sketchy resumé of this most interesting and vital subject, you have thought of many things omitted or overlooked and of some phases of the subject given but scanty consideration.

Personal experience teaches me that the farther one follows the often devious and deceptive road of focal infection the clearer become many of one's problems. Perhaps you may feel that I am endeavoring to account for too much in this direction and am attempting to light up many of the dark places by an ignis fatuus. I am well aware that new scientific theories, if at all plausible, like new religious cults, often stimulate undue enthusiasm and fervor in their devotees. In our desperate need of help in the fight against disease we should be excused if sometimes we grasp at straws, but it must be remembered that it is just this grasping in the dark, combined with the will to secure help from somewhere, somehow, which is the essence of scientific advancement.

Added research will, no doubt, show us that focal infection is not in itself a complete entity but only the forefront of a vast unexplored background in which lie concealed and undeciphered the intricate problems of immunity and biologic chemistry. It is in this hinterland that we must search for the true primary cause of disease. In other words, the infections we now see and experience are but the seeds; the background of which we know little or nothing is the soil.

For centuries prior to Pasteur the science of medicine was a compassless ship, captained, it is true, by many a good, intrepid and ingenious mariner. The great genius of Pasteur has given it direction. Now we have many charts to further our explorations into new worlds. Among these, and not the least of them, is the domain of focal infection.

THOMSON, E. S.—CONDITIONS OF THE OPTIC NERVE CAUSED BY DISEASE OF THE SINUSES

The author is of the opinion that most cases of optic nerve lesions are caused by disease of the accessory nasal sinuses. He does not think that multiple sclerosis is as important as an etiological factor, because in many of these cases sinus involvement cannot always be excluded.

The three types of optic nerve disease described as secondary to sinusitis are: (1) optic retrobulbar neuritis, presenting inflammation of the nerve portion nearest to the sphenoid and posterior ethmoid cells; (2) plastic neuritis, associated with hemorrhages, extensive chorioretinitis with retinal edema, vascular engorgement, visual depression, and enlargement of the blind spot. These two types tend to be unilateral and thus suggest local infection. They require early sinus operation if atrophy of the optic nerve is to be prevented. Operation is most effective during the hyperplastic stage of sinus osteitis. The author describes fully the operative technique employed by MacKenty and by Faulkner and agrees with both surgeons that a thorough and complete operation secures the best results, and eliminates future severe reactions from residual diseased tissues; (3) sudden functional depression without apparent changes in the optic nerve, but usually associated with an enlarged blind spot, a central color scotoma and later contracted visual fields. This affection may or may not be double sided. Frequently the roentgen plates show no sinus involvement and the tissues at operation are found apparently normal. Yet in many of these cases vision rapidly returns to normal after a radical operation and histologically the posterior ethmoid and sphenoid walls present bone changes.

The diagnosis of optic neuritis is helped by exclusion through general tests, the presence of associated retinitis or of other suggestive nasal conditions, the character of persistent nasal bacteria.

Postoperatively the optic nerve begins to improve within 48 hours. In functional cases without nerve lesions vision often improves in a few days. In retrobulbar neuritis improvement is slower, in one case vision returning ten days after complete exenteration of the ethmoids and sphenoid. In plastic neuritis the time required is still longer, e.g., the condition of no perception of light in a man, aged 25 years, cleared up

to 20/30 vision two months after sinus operation. Obviously, however, complete recovery depends on the stage when operation is performed. A temporizing course is inadmissible in retrobulbar and in plastic neuritis, although a certain number of cases of the former type partially recover without operation. In some functional cases, or in certain cases of iritis or choroiditis, intranasal treatment or suction can be employed instead of surgery, yet better results are even here obtained from sinus exenteration. The author states that an operation on the sinuses has often given surprisingly good results in visual acuity in late cases of functional nerve disturbance if there was evidence of plastic inflammation.

From a review of the foreign literature since 1926 the author concludes that most physicians recognize latent sinusitis as a cause of optic neuritis. They consequently advocate operation on the sinuses, which they regard as injurious without skilled technique.

In the author's own opinion optic nerve disease is a rare yet a very serious complication of sinus disease and requires prompt, complete and thorough operation on the sinuses. (*Arch. Otolaryng.* 10: 248-61. 1929.)

BRINTON, A. G.—THE FREQUENT ASSOCIATION OF DISEASES OF THE EYE  
WITH PATHOLOGICAL CONDITIONS OF THE TONSILS  
AND SINUSES

The author states that the various types of headaches in asthenopia are frequently due to pharyngeal and sinus conditions. He attributes follicular conjunctivitis and so-called spring catarrh to irritations and inflammation of the naso-buccal-pharyngeal mucosa, and in some instances to adenitis. In other cases rhinitis and sinusitis are responsible for recurrent conjunctivitis, or for spring catarrh. The latter affection may also develop after an insufficiently treated or inadequately removed tonsil. The author observed the following eye lesions secondary to tonsillitis and sinusitis; non-ulcerative guttate keratitis; scleritis and episcleritis; progressive myopia in children; and states that tonsil and sinus treatment has generally ameliorated these conditions. He reports conical cornea resulting in progressive myopia as due to adenitis. As sequelæ to septic tonsillar conditions he reports double cataract in a man, aged 50 years; chronic choroiditis associated with hyalitis and retinal detachment in a boy, fourteen years of age, which distinctly improved after tonsillectomy; recurrent hemorrhagic retinitis in a man, aged 22, where tonsillectomy stopped the ocular hemorrhages. Pharyngitis and septic tonsils were responsible for a case of bilateral optic neuritis with sudden failure of vision in a girl aged twenty, who responded with marked visual improvement to tonsillectomy and autogenous vaccine treatment. The author recommends examination of tonsils and sinuses in pathologic conditions of the eye. (*J. Med. Assoc. So. Africa* 3: 575-76. Oct. 26, 1929.)

ELLETT, E. C.—THE RELATIVE IMPORTANCE OF DISEASE OF THE NASAL SINUSES AS A CAUSE OF DISEASE OF THE OPTIC NERVES

The paper is divided in two parts, of which the latter is irrelevant to the present inquiry and therefore not considered in this abstract.

In the first part the author briefly reports a case of pansinusitis producing bilateral choked disks with entire blindness in one and partial vision in the other eye. At operation all sinuses were found filled with pus. Post-operatively the young woman ultimately recovered bilateral vision of 20/20 after correction with a 2 diopter lens.

The second patient, a man aged 39 years, presented left optic neuritis associated with a relative large and absolute central small scotoma. General physical examination and clinical tests were negative. The roentgen film showed increased density of the ethmoids and sphenoid sinus. Operation on the nasal sinuses revealed no gross nasal pathologic changes nor any pus. About 14 months postoperatively the visual field returned to normal.

From a review of the literature the author agrees with Leon White that about 85 per cent of the cases of optic neuritis are due to conditions of the teeth and tonsils, and only 15 per cent depend on lesions involving nasal sinuses. (*Arch. Otolaryng.* 10: 49-60. 1929.)

HILL, E.—THE PARANASAL SINUSES IN RELATION TO DISEASE OF THE OPTIC NERVE

The author reports six cases, three in women with ages ranging from 28 to 55 years, and three in men with an age range of 17 to 25 years. The youngest woman exhibited macular choroidoretinitis associated with retrobulbar neuritis in the other eye. A tonsillectomy had been done, but the ocular conditions only cleared up after drainage of the purulent left frontal, ethmoid and sphenoid sinuses. Vision improved to 5/5 in six weeks. The second woman had mild optic neuritis with contracted fields of vision due to purulent sphenoids and ethmoids. Drainage of the sinuses, followed later by an external operation for right frontal sinusitis, resulted in normal fields of vision after one year. In the oldest woman a sudden blurring of the right vision and an absolute right scotoma occurred and was traced to tonsillar infection and purulent bilateral antra and ethmoids. Operation upon the sinuses caused ocular improvement and after three months restored vision to 5/6. The sudden attack of left optic neuritis with dilation of the superior temporal vein in the 17 year old boy was ascribed to pathologic tonsillar stumps. After removal the optic condition became worse and improved only after irrigating the sphenoid sinus, containing some shreds of mucus. One year later vision was restored to 5/4. Of the other men one gave a past history of mild ethmoiditis, all tests were negative, tonsils and teeth had previously been removed, so that the sudden reduction of vision with variable refraction was clinically unexplained.

An x-ray plate showed a clouded left antrum and bilateral pathologic sphenoids. Active spheno-ethmoiditis developed and was treated by sinus lavage. Since then vision improved to 5/10. In the other man sudden left blindness, associated with an absolute central and a relative scotoma, was due to infected tonsils and left antrum as well as double spheno-ethmoiditis. One month after tonsillectomy and drainage of the sinuses the visual fields were found normal and visual acuity was 20/20. Ten months later a sudden attack of total blindness recurred in the right eye with an absolute central scotoma, caused by recurrent antral and ethmoidal infection. Ten days after drainage of the sinuses the scotoma was only relative and vision had improved to counting figures at six inches. This patient was then lost sight of.

In commenting upon this series the author urges the importance of examining the sinuses in cases of unexplained impaired vision with normal eye grounds. He states that optic nerve disturbances are apparently caused by hyperplasia of the membranous sinus lining.

In the absence of infection more ventilation of the sinuses has had an unsettled effect. The frequency of the sinus origin of optic neuropathy is placed by Loeb as 15 per cent, by Woods and Dunn as 12.7 per cent and by Cheval and Coppez as from 34 to 40 per cent. (*N. Y. State J. Med.* 29: 135-38. 1929.)

MACCALLAN, A. F.—TOXIC ABSORPTION DUE TO FOCAL SEPTIC LESIONS:  
ITS EFFECT ON THE PRODUCTION OF EYE DISEASES

Products from focal sepsis may infect the eye by (1) direct extension, (2) lymphatic absorption, (3) deglutition with subsequent gastro-intestinal absorption. The (1) method occurs usually from infective tonsils or from sinusitis, the (2) generally from chronic tonsillitis, the (3) from any tonsillar or pharyngeal inflammation. Eye diseases in children associated with enlarged septic tonsils are blepharitis, phlyctenular conjunctivitis, iritis, cyclitis, coronary cataract, progressive myopia. The author advises early enucleation with appropriate postoperative local ocular treatment.

The rest of the article is irrelevant to the present inquiry. (*Brit. M. J.* 2: 943-47. Nov. 1929.)

THEISEN, C. F.—ETHMOIDITIS IN INFANTS AND YOUNG CHILDREN WITH  
ACCOMPANYING EYE AND ORBITAL COMPLICATIONS

The author reports thirty-one cases: fifteen of ethmoiditis and sixteen of ethmoiditis and maxillary sinusitis. The condition was largely diagnosed by x-ray plates. The ages ranged from six months to nine years. Of the six youngest patients with ethmoiditis three presented orbital abscess with exophthalmos, and three presented bulbar chemosis with localized inflammation of orbit and eyelids. Twenty-five patients had enlarged tonsils and adenoids which were removed, but this operation showed no positive modifying effect on the existing sinus condition. Combined ton-

sillectomy, adenectomy and antral lavage induced great improvement in two cases of secondary multiple arthritis. The author names influenza, simple colds and hay fever as etiological factors and states that sinus infection was due in five cases to scarlet fever, in two to measles, in three to diphtheria, in one to bronchopneumonia, in five to foreign bodies in the nose. Prognosis is generally favorable and most cases yield to conservative treatment. Radical surgery is usually contraindicated except in cases complicated by orbital abscess or other severe systemic conditions. (*Trans. Am. Laryng. Soc.* 50: 163-82. 1928.)

#### BROWN, J. MACKENZIE—SINUSITIS IN CHILDREN

The author discusses the anatomical condition of the sinuses. The sphenoid sinuses become clinically significant about the age of three or four years; the frontal sinuses rarely before the age of eight years. According to Mitchell ethmoid involvement was present in 145 cases of sinusitis, 84 of which also involved the antra, and two of the sphenoids and frontals each. The author fully describes suppurative and hyperplastic types of sinusitis, but reports no case histories.

Among common local sequelæ he mentions chronic and acute otitis media, headache and facial pain from irritation of Meckel's ganglion; conjunctivitis, keratitis, orbital cellulitis; adenitis and laryngitis. Systemic complications of sinusitis are chronic bronchitis, bronchiectasis, asthma, gastro-intestinal disturbances usually of the cholera infantum type; also secondary complications of nephritis; pyelitis; arthritis, chorea, anemia; and cardiac lesions. The author believes in conservative medical treatment combined with the removal of the tonsils and adenoids. He agrees to radical surgery on the sinuses of children, however, only when complications demand immediate relief. (*Ann. Oto. Rhino. Laryngol.* 38: 500-05. June 1929.)

#### FINKELSTEIN, H.—AURAL AND NASAL SUPPURATION IN IMPORTANT SOURCES OF ORGANIC AND GENERAL DISEASES

Before the age of three years the ethmoids and antra are usually involved, preceded generally in nurslings by rhinitis, influenza or non-specific inflammation of the oral mucosa. After the age of three years the other sinuses are likewise involved and preceded in school children usually by measles, diphtheria, scarlet fever.

In nurslings the ethmoiditis may cause unilateral benign edema of the upper eyelid, more rarely orbital phlegmons or meningitis. Occult otitis media in nurslings is interpreted as a general systemic disease exhibiting fever, diarrhea, loss of weight, and can be cured by antrotomy or paracentesis with or without a simultaneous change in dietary regimen.

In chronic paranasal sinusitis systemic infections are frequent: bronchiectasis, colic, arthritis, endocarditis, hemorrhagic nephritis, genuine lipoid nephrosis, cough. The prognosis is usually good in conservative

treatment of accessory sinus disease. Tonsils and adenoids should be removed followed by sinus drainage, climatic and dietary therapy, and head light baths.

The author states, however, that results are only fair and recurrence is frequent. (*Jahresk. f. ärztl. Fortb.* 19: 1-14. 1928.)

HARKNESS, F. G.—KIDNEY INFECTIONS IN CHILDHOOD FROM EAR, NOSE AND THROAT VIEWPOINT

From a survey of the literature the author concludes that the acute nephritides of childhood are either glomerular or tubular in type. The former is intimately associated with acute or latent streptococcal infection usually of the upper respiratory tracts including the ear. The latter is rare, and is often associated with disease of the accessory nasal sinuses. On various renal conditions the author comments as follows: In pyelitis the primary irritant results from bacillary infections of the upper respiratory tracts, especially the faucial tonsils. Surgical removal of the tonsils often improves the renal condition whereupon nature eliminates the secondary invader, the colon bacillus.

In pyelo-nephritis, glomerular and parenchymatous nephritis, diseased tonsils should be removed, particularly if convalescence is slow, even if other foci of infection have been eliminated. Postoperative relief is proportionate to the chronicity of the primary infectious process. Renal inflammations and toxemias are often referable to sinusitis. Headache is not a symptom of sinus disease in children below the age of eight years. In chronic nasal sinus diseases the appearance of the pharyngeal wall is particularly significant. Clinically the removal of these foci of infection is expedient for they are the chief cause of disturbed metabolic conditions producing kidney lesions.

The author describes various surgical methods. He states that radical surgery of the antra is rarely indicated, and is very exceptional of the ethmoid region, while in surgery the first essential is conservatism. (*J. Iowa State Med. Soc.* 19: 444-49. Oct. 1929.)

WATSON-WILLIAMS, E.—VARIATIONS IN THE INCIDENCE OF PNEUMOCOCCAL INFECTION IN THE NASAL ACCESSORY SINUSES OF CHILDREN

The author reports a series of 3,011 explorations of the antral, sphenoid and ethmoid sinuses made from January, 1920 to April, 1929 in 1,054 patients of whom 242 were children between the ages of one and fourteen years. A high incidence of pneumococcal infection was found. Of 88 patients two children and five adults have had proved pneumococcal or lobar pneumonia and two further cases each of pneumococcal meningitis and pneumococcal mastoid disease were also reported. Comparison with the mortality rate for lobar pneumonia shows that the rise and fall of pneumococcal sinus infection precedes that of pneumonia. It may possibly in future form a reliable forecast of the trend of mortality from lobar pneumonia. (*Brit. M. J.* 1: 720-21. April 1929.)

CONVY, L. B.—THE RELATION OF NASAL SINUS DISEASE TO BRONCHIAL ASTHMA

The author discusses the literature on the etiology of allergic asthma and the significance of acute nasal infections as etiological factors. He describes the nervous mechanism of bronchial asthma. Intrinsic bronchial asthma is entirely related to sinusitis and dates either from an acute respiratory infection, a previous cold, or irritation due to chronic ethmoiditis. Diagnosis should rest on exhaustive case history; complete physical examination excluding cardiac and renal dyspnea, mediastinal tumor and aneurysm; roentgen studies of sinus, nasal and pharyngeal conditions; blood calcium estimates; cutaneous tests with proteins and pollens. Treatment methods are: thorough desensitization and application of an auto-genous vaccine from sputum and nasal mucous membrane; a diet rich in lime to correct calcium deficiency; quartz lamp therapy; removal of pathological conditions in the nasal sinuses; surgery in definite ethmoid hyperplasia. In children diet is one of the chief points in treatment. The author reports three cases of bronchial asthma in men aged 57 and 38 respectively and in a woman aged 45. Permanent and immediate relief from the asthma resulted in the men from tonsillectomy and radical sinus operation, and in the woman from bilateral radical operation of the ethmoids. (*Med. Sentinel* 37: 569-73. Oct. 1929.)

QUINN, L. H. AND MEYER, O. O.—THE RELATIONSHIP OF SINUSITIS AND BRONCHIECTASIS

The author first studied 38 patients with bronchiectasis, 22 or 57.9 per cent of whom had definite associated sinusitis. The sex ratio of the group was 12 women to 10 men. The age range was from 9 to 66 years of age. Preceding symptoms or illnesses were reported by 7 or 31.8 per cent as pneumonia associated with or without influenza and empyema; by 5 or 22.7 per cent as influenza. Bronchiectasis was bilateral in 17 cases; in three cases the right and in two the left bronchus only was involved. Six patients had mild, ten had moderate and six had advanced bronchiectasis, which was confirmed in seventeen patients by roentgen examination following insufflation of iodized oil. Seven patients had pansinusitis and in twenty others the maxillary sinus alone or in conjunction with other sinuses was involved. Previous tonsillectomy had been done in fifteen cases, but tags persisted in one-third. From the analytical table I (p. 155) of the series no direct relationship can be determined between the degree of sinusitis and bronchiectasis, nor any greater involvement of the right lung as stated by Adams.

Next, the author studied the sixteen cases of this above group who presented no evidence of sinusitis. The sex ratio was ten men and six women. The ages ranged from eight to fifty-one years. The preceding illnesses were stated as pneumonia, influenza and colds. Bronchiectasis was bilateral in nine cases, in four the left, and in three others the right



lung was involved alone. Three patients had early, six had moderate and seven far advanced bronchiectasis. The diagnosis was proved in eleven insufflations of iodized oil; fifteen patients still had their tonsils at the time of admission, all of which were reported as septic (cf. table 2, p. 157).

Of the third series of twelve cases of chronic bronchitis with or without manifest bronchiectasis only four showed associated sinusitis; five had diseased tonsils associated with sinusitis; one had rhinitis; one had chronic otitis media, and one had no definite possible focus of infection.

The authors conclude that aspiration is probably the chief etiologic factor in bronchiectasis secondary to sinusitis. (*Arch. Otolaryng.* 10: 152-65. Aug. 1929.)

BRINDEL—NECROSING OSTITIS IN GRIPPAL SINUSITIS  
(Ostéite Nécosante dans les Sinusites Grippales).

The author reports grippal sinusitis in girls, aged 11 and 14 years respectively, which was followed in the younger child by a fronto-ethmoidal abscess and right maxillary sinusitis with necrosis of the frontal bone; and in the older child by bilateral orbital edema, and abscess of the left frontal bone with necrosis. The younger girl recovered three weeks after symptomatic medical treatment, incision and drainage of the abscess and lavage of the maxillary sinus. Medical treatment and drainage of the abscess had to be supplemented in the older girl by a Caldwell-Luc operation on the maxillary sinus and an Ogston-Luc operation on the frontal sinus, with complete recovery two months later. (*J. de méd. de Bordeaux* 59: 671-73. Aug. 1929.)

KISTNER, F. B.—CHRONIC NON-PURULENT SINUSITIS AND ITS CLINICAL SIGNIFICANCE

The author reports systemic infection secondary to chronic nonpurulent sinusitis as follows:

1. Subacute polyarthritis lasting nine months in a man forty-three years old, in whom sinus infection was suspected lacking evidence of other sources. At exploration of the antra the right antrum exhibited two small glandular cysts in the alveolar recess and slightly thickened membranous lining; the left antrum was moderately thickened throughout. Cultures from the infected areas showed streptococci specific for the joints of rabbits. Three days after operation the hitherto crippled patient could move about comfortably. At the time of the report his gait was again normal after orthopedic correction of secondary structural changes in feet and ankles.

2. Chorea minor lasting from eighteen months to three years in five cases ranging in age from nine to thirteen years. Tonsils and adenoids had been previously removed elsewhere without more than temporary relief. All cases presented multiple chronic sinus infection, the antra being

purulent in two, nonpurulent in two, and unilaterally purulent associated with nonpurulent ethmoid and sphenoid on one side in one case. Antral exenteration caused immediate and definite improvement in all but the last case, who required operation of the ethmoids and sphenoids to make a complete recovery.

3. A case of secondary anemia with cholecystitis due to chronic nonpurulent sinusitis. No further details are given beyond the statement that the blood picture rapidly returned to normal after double radical antrum operation.

4. A case of tachycardia, dyspnea and fatigue of unknown origin, where physical examination revealed mild diabetes, chronic cholecystitis, chronic nonpurulent sinusitis and tachycardia. Cardiovascular findings proved normal. All subjective symptoms were entirely relieved following sinus operation.

5. A case of infectious atheromatous cardiovascular disease with cardiac failure and antral disease. Removal of septic tonsils brought no relief. After radical antrum operation prompt cardiac recompensation was obtained, and patient was able to resume business and moderate outdoor athletics.

6. Facial tic in three boys, aged 14, 11 and 14 years respectively. The first boy was under observation for eight years during which period suppurating sinusitis changed into latent, chronic nonpurulent sinusitis presenting only moderate thickening of the sinus wall. The boy recovered about one year after bilateral radical antrum operation. The sinus history of the younger boy was negative as was antral lavage and cytologic examination, but the radiograph revealed antral involvement. Bilateral antrum operation revealed moderate edema and three glandular cysts in the lining of the right antrum and definite hyperplasia of the left antrum. Postoperative improvement was striking. Several relapses occurred during the first three months of school, but to date the boy is almost normal. The third boy had infected tonsils, purulent antra and suspected ethmoidal infection. Removal of tonsils and adenoids brought no improvement. He definitely recovered only after radical operation of the antra and exenteration of sphenoids and ethmoids which were found hyperplastic throughout.

The author describes histologic changes and compares the bacterial flora in various stages of different types of sinus infection. In his opinion purulency depends on the type of infecting organism, and nonpurulency is generally a latent or chronic phase of sinus infection. He believes in the radical removal of all infected tissues. (*Ann. Oto. Rhino. Laryngol.* 38: 795-804. Sept. 1929.)

POTTENGER, F. M.—ACUTE ARTICULAR RHEUMATISM AN ALLERGIC  
MANIFESTATION

In primary streptococcal infection of the tonsils the bacilli may escape into the bloodstream and sensitize the body cells. Since streptococci have a predilection to heart valves and joint structures, they start allergic re-

actions in these organs. In the former the inflammatory reactions tend to proliferation rather than exudation. In the joint the reaction is chiefly exudative which may later become proliferative or may disappear upon absorption of the exudate. In either case the course of the infection depends upon its severity and upon the prolongation of the allergic reaction. Since there is a relationship between tonsillitis and joint infection, tonsillectomy should relieve the articular conditions by eliminating the source of reinoculations. In an acute attack of articular rheumatism the operation should be carefully considered lest surgical trauma cause renewed infection. (*Cal. & West. Med.* 32: 125. Feb. 1930.)

BALLENGER, H. C.—MENINGITIS (*Staphylococcus aureus*) SECONDARY TO SINUSITIS WITH OPERATION AND RECOVERY

A review of the records of the Children's Memorial Hospital showed 24 cases of septic meningitis—13 due to streptococcal and 10 to pneumococcal infection—from 1919 to August, 1929. Of these 23 died in from one to fifteen days, one patient was removed from the hospital in a dying condition. To these cases the author adds that of a six year old boy, whose past history showed one month before admittance diarrhea, vomiting and sinusitis, and two days before a purulent nasal discharge, a frontal headache, with fever, convulsions, swelling of the forehead and left eyelid. The spinal fluid gave a 2+ Pandy test and in cultures showed *Staphylococcus aureus*. Patient was given 10 c.c. of antimeningococcus serum. On the next day the left frontal sinus was opened, its inner table removed with the septal wall of the frontal sinus. Both sinuses and the dura were drained of thick yellow pus, which on culture revealed *Staphylococcus aureus*. The same organism was found in the culture from the sinuses, dura, nose, spinal fluid and blood at different times. Postoperatively the patient developed pneumonia of the left lower lobe involving later the right axillary region. About two weeks postoperatively an abscess each occurred over the occipital and parietofrontal regions, and a few days later a third abscess developed over the left parietal region. The author believes these were probably caused by osteomyelitic processes. They were incised and drained. The first negative blood culture was obtained 19 days postoperatively. On the 21st day patient suddenly developed complete paralysis of the pupil and muscles of the right eye, which continued to November 1st, with slight improvement. The patient has recovered but for a slight discharge from one of the abscesses on the scalp. (*Arch. Otol.* 11: 385-88. March 1930.)

LAWSON, L. J.—THE ROLE OF NASAL ACCESSORY SINUS MEMBRANE IN SYSTEMIC INFECTIONS AND TOXEMIAS

Lawson believes that the sinuses account for a considerable amount of systemic infection but that they occupy a secondary place to diseases of the pharynx and teeth.

The following bears on the present subject: "The lower respiratory and gastrointestinal tracts may be affected by direct distribution along

the membrane, by blood and lymph circulation or by inhalation of septic particles." The swallowing of great numbers of organisms may eventually render the gastrointestinal mucous membrane more susceptible to blood stream invasion.

Chronic toxemia may result from prolonged infection due to minute doses of virulent toxin. The symptoms are sallow skin, anemia, weakness, prostration, loss of appetite, lowered mental and physical efficiency. It is the author's opinion that endocardial lesions are rare in chronic sinus disease but that there are more myocardial involvements than are commonly admitted in the literature. (*Am. Oto. Rhino. Laryng.* 39: 159. March 1930.)

ROSSIER, P. H. & GUGGISBERG, E. F.—LATENT MAXILLARY SINUSITIS:  
Its Importance for Internal Medicine

The study comprises 839 patients from the medical ward of the clinic of the University of Lausanne in whom routine rhinological examination disclosed latent maxillary sinusitis. The series included 512 men and 327 women. The age range is not stated. Latent maxillary sinusitis was presented by 5.47 per cent of the men and 4.89 of the women, or by 5.24 per cent of all patients. It was clinically demonstrable in 18 per cent of patients with non-tuberculous bronchial diseases, such as acute and chronic bronchitis, asthma, but in only 0.8 per cent of tuberculous respiratory diseases. It was associated with 6.6 per cent of all nervous diseases and with 6 per cent of all digestive disturbances. On the other hand, it was rare in patients presenting vascular and circulatory diseases as well as urogenital lesions, being found in only one patient who had chronic cystitis.

The authors believe that latent maxillary sinusitis is far more frequent than commonly assumed, and they suggest rhinological examination of clinical patients, particularly those having respiratory diseases. If maxillary sinusitis is established then prognosis and treatment in these cases must be modified accordingly. They point out that contrary to tonsillar infections, sinus infections less frequently produce renal involvement. (*Schweiz. Med. Wchschr* 10: 1081-83. 1929.)

LANDIS, J. E.—HERPES ZOSTER OPHTHALMICUS APPARENTLY DUE TO CHRONIC  
FRONTAL SINUSITIS

An Italian laborer, aged sixty years, had developed a typical herpetic eruption over the entire frontal area and around the right eye. Pharynx, tonsils and nasal passages were congested; the right nose contained several polyps and pus was found in the middle nasal passage. Ocular findings showed edema of the lid and slight overfilling of the retinal veins. From the roentgen standpoint there was no evidence of sinus disease. The condition was diagnosed as chronic right frontal sinusitis with right chronic ethmoiditis and polyposis associated with the right frontal herpes zoster.

A radical frontal operation was performed by the Lothrop method. (*Penn. Med. J.* 32: 765-66. Aug. 1929.)

CARMODY, T. E. AND GREENE, L. W.—THE RELATION OF SINUS DISEASE TO  
HAY FEVER

The authors hold the theory that hay fever cannot be produced without previous sinus infection or pathologic membranes responding to various irritants. They report a series of 103 cases, in some of whom hay fever had recurred annually from one to twenty years. An X-ray check-up of cases giving positive skin tests showed varying degrees of membranous involvement. The treatment consisted of simple ichthyol and glycerin tampons, to which seventy-seven cases responded. Nineteen cases were cured by simply uni- or bilateral puncture of the maxillary sinus, and five cases by radical operation on the maxillary sinuses and exenteration of the ethmoids.

The authors state that hay fever most commonly affects the maxillary sinuses, and next in the order of frequency the ethmoids, frontals and sphenoids. (*Ann. Oto. Rhino. Laryngol.* 38: 759-67. 1929.)

## GLASER, W. A.—SURGICAL AND NON-SURGICAL FACIAL NEURALGIAS

The abstract of this paper mentions only the points relevant to the present inquiry.

The author describes two types of sphenopalatine neuralgia. The milder type usually starts with a history of coryza. The pain involves the root of the nose, the ocular areas, upper jaw and teeth and occasionally the lower. In extending backward to temple and ear, the pain was most severe five cm. back of the mastoid. Sometimes the extended pain involved the occiput, neck, shoulders, or even the entire arm down to the fingers, and was associated with an aching or stiff throat, or itching of the hard palate. The sympathetic symptoms which occurred even without pain, were sneezing fits, a thin, hot, profuse secretion, increased tearing and reddening of the eyes, pupillary dilatation, asthenia, photophobia and dry râles. The same pain syndrome was present in severe cases, where it was believed due to central lesions of the maxillary and vidian nerve secondary to sphenoidal inflammation. In these cases intrasphenoidal application of cocaine is indicated, according to Sluder, or in still more severe cases applications of formaldehyd and silver, or injection of ganglion. If medication gives no relief, the sphenoid should be opened to free the nerve and ganglion from possible chronic inflammatory tissue.

The author adds that any therapy frequently results only in temporary relief and that the whole problem of sphenopalatine neuralgia is still largely unsolved. (*Cal. & West. Med.* 32: 174-78, March, 1930.)

SATKE, O.—ETIOLOGY AND THERAPY OF THYROIDISM  
(Zur Aetiologie und Therapie des Thyreoidismus)

The interrelation of Basedow's disease with tonsillar and adenoid lesions was stated in 1891 by Hermann, who reported regression of a typical Basedow after adenectomy in a small girl. In 1912 Sendziak gave

similar results from tonsillar and adenoid operations in some cases of thyroidism. American medical men—King, Niord, Bixby—also reported cases of Basedow's disease due to tonsillar changes. In 1912 Brown stated that tonsillectomy cured a number of Basedow cases. In 1926 Van Syk reported a case of congenital hyperthyroidism in a fourteen year old girl which distinctly improved after tonsillectomy and naso-pharyngeal ennetage.

The author distinguishes between Basedow's disease and thyroidism. The latter is more frequently a sequel to other infections, lacks genuine exophthalmos and vascular noises above the thyroid, and disappears rapidly when the primary focus of infection has been eliminated. The author reports six cases of thyroidism—only one case is given in detail—due to intercurrent angina, five of which were cured after tonsillectomy and showed normal metabolism 2-3 weeks postoperatively. One case recovered after conservative treatment. He concludes that in thyroidism due to diseased tonsils the tonsillogenous toxin probably involves the autonomous nervous secretory regulators of the thyroid. Postanginal thyroidism is therefore promptly cured by tonsillectomy. (*Ztschr. f. klin. Med.* 111: 707-17. 1929.)

BROWN, LOUIS E. (AKRON, OHIO)—A FURTHER STUDY OF THE RELATION  
BETWEEN THYROTOXICOSIS AND TONSILLAR INFECTION

The author states in substance that since his first paper on this subject in 1920 he has had increasing proof and corroboration from many sources of the intimate relationship between diseased tonsils and toxic goiter.

"To date there have been several articles and lectures given propounding the same theory as that given by the author . . . Today it is a known fact that this relationship does exist and that tonsils are a definite causal factor in many cases of toxic goiter."

He advocates both thyroidectomy and tonsillectomy in the advanced cases. He quotes Dr. Squire and Dr. Newburg of the University of Michigan as saying: "In those cases of Graves Disease which have come under observation an acute infection has led very commonly to an exacerbation of all the symptoms of thyroid disease. Accordingly the search for and elimination of focal infection has become an accepted routine in the treatment of this condition. The improvement following the removal of such foci has frequently been striking." (*Laryngoscope* 39: 598-607. Sept. 1929.)

HASTINGS, HILL.—TONSILLECTOMY IN ADULTS FOR RHEUMATISM WITH  
CRITICAL REVIEW OF RESULTS

Hill Hastings, in a very instructive and carefully worked out report on selected types of rheumatism in 130 patients, gives the following results:

Rheumatism improved 25, much improved 15, cured 40, not improved 24, unknown results 26.

"A general survey of these cases showed that most of these patients had suffered off and on for years with pain and stiffness on one or several joints, at times acute and temporarily crippling. A few gave a history of tonsil trouble. Some no history of throat trouble."

In seven cases tonsillitis was a forerunner of rheumatism. He believes that the joint symptoms are due more to sensitization of the joints than to actual bacterial invasion activated by the toxins from the tonsils.

His criticism of the wholesale removal of tonsils with too little regard for the necessity of the operation is well taken.—"Any established infection of the nose is a constant menace to the lower respiratory tract. Anemia, cough, expectoration of mucus and blood, loss of appetite, and even nocturnal fever and sweats may occur in chronic purulent sinusitis. Tuberculosis may be simulated. Low toxæmia continuing over long periods may have much to do with the progress of the so-called degenerative changes of later life."

#### PAVEY-SMITH, A. B.—TONSILLECTOMY IN CHRONIC ARTHRITIS:

A report of 200 cases carried out at the Royal Bath Hospital, Harrowgate.

The 200 serial cases comprised 67.5 per cent females and 32.5 per cent males. The ages ranged from ten to sixty-four years, the average being thirty years. The attacks of arthritis had lasted from under one to over five years. In search for a tonsillar focus attention was paid to the history, size, color, crypt contents of the tonsils and to the associated lymph nodes. In a healthy tonsil these points are negative. Before selecting patients for tonsilleectomy purulent nasal and sinus infection and dental sepsis must have been dealt with. A history of recurrent tonsillitis is favorable in focal arthritis and to a lesser degree in subacute rheumatism. The results of tonsilleectomy, reported from three months to six years postoperatively give a ratio of 134 good to 38 bad results. The result percentage for the series is 78 per cent good. Better results were obtained in younger patients and with shorter duration of the disease. Yet age and duration are no absolute bar to success. Because of good results in the subacute rheumatic group the author recommends tonsilleectomy as a routine prophylaxis against recurrence and later endocarditis. In chronic focal arthritis due to tonsillar infection improvement after tonsilleectomy may be expected in 80 per cent. (*Lancet* 1: 170-73. 1929.)

#### KAISER, A. D.—THE RELATION OF THE TONSILS TO ACUTE RHEUMATISM DURING CHILDHOOD: A Study of 439 Children with Acute Rheumatism.

Of 439 Rochester children studied, 241 had characteristic attacks of rheumatism, 138 had acute articular pains without redness or swelling, and 60 had growing or muscular rheumatism pains. The ages for the

series ranged from five to fifteen years; the most susceptible age period of onset of rheumatism being from eight to fourteen years. Before the age of five acute rheumatism is infrequent; 255 children developed the disease before and 110 after tonsillectomy; and of the non-operated group 80 had one or more recurrences, while only 56 of the operated group had a recurrence after enucleation. The author concludes that recurrent rheumatism is 10 per cent less frequent if the tonsils are removed after the first rheumatic attack.

The incidence of rheumatic carditis as a complication is apparently as frequent in children with as in those without tonsils. The same statement can be made for chorea as complicating acute rheumatism. The author believes that tonsillar infections have a definite relationship to this disease and he advocates the removal of the tonsils until the etiology of rheumatism is better known. (*Am. J. Dis. Child.* 37: 559-64. March, 1929.)

#### UFFENORDE, W.—SEPTIC SEQUELAE OF ANGINA

(Die Angina und ihre septischen Folgezustände.)

The author attributes the inflammatory disposition of the tonsil to its anatomical structure and the character of its crypts. Local pressure from pharyngeal muscular contractions stimulate or rather irritate the residual collections from acute processes of the tonsillar tissue. Recurrent angina may also be produced from mechanical traumatism of the tonsils, e.g. suction. Epidemiological factors may be significant. The author agrees with Schottmüller in recognising sepsis with and without metastases. The septic focus is usually located back of the tonsil although the original infection is tonsillar. Laryngeal edema is generally unilateral; in two cases tracheotomy was necessary because of complete laryngeal edema. Bilateral peritonsillitis was presented once among four siblings. Two infants aged two years, presented peritonsillar abscesses. Inflammatory processes of the peritonsillar tissues are frequently encapsulated, yet small abscesses may often be overlooked. Inflammation can be transmitted to the parotid area and the retropharyngeal space. The author discusses a series of 140 cases, including six of his own. The majority of patients were between thirty and forty years of age. He reports that the veins are often not involved or, if so, are infected from the lymphatics. Occasionally neither phlegmons nor glandular lesions occur. Chronic sepsis is treated in the sense of a toxic disturbance from focal infection. Prognosis depends largely on the differential blood picture. Surgery is the most effective treatment.

Early tonsillectomy and external ventilation of the clefts make any vascular surgery unnecessary. In his opinion tonsillectomy is indicated whenever acute inflammations have not led to abscess formation and general and systemic symptoms persist after eight or ten days. In chronic cases the clinician and laryngologist should consult together with respect



to surgical indication. Postoperative inflammations were always mild and uncomplicated. (*Sitz-Ber.d. Ges. z. Berforder. d. ges. Naturwiss. Marburg* 63: 167-91. 1929.)

UFFENORDE, W.—TONSIL INFECTION CAUSING GENERAL SEPSIS  
(Weitere Beiträge zu der von den Mandeln ausgehenden Sepsis)

The author briefly reports two cases of general sepsis after adenotomy and tonsillectomy. In both the retropharyngeal wall had been traumatised during the operation, causing in one patient a retropharyngeal abscess, nephritis and respiratory trouble, and in the other patient multiple metastases to lungs, pleura, endocardium and kidneys. The blood vessels were not involved in either case, the infection having propagated by way of the lymphatics. Both patients recovered after splitting and drainage of the retropharyngeal abscess with blunt ventilation of the retropharyngeal space. Another patient with recurrent angina developed painful glandular swelling at the angle of the left jaw. Enucleation of the left tonsil showed no free pus, but on exposure of the vascular sheath a suppurative gland, size of a filbert was found. After ventilation of the pharyngeal space and drainage of the abscess patient recovered, but one month later acute lymphadenitis recurred and subsided after removal of the enlarged lymph glands. Another patient who had apparently recovered from recurrent angina developed four weeks later a thoracic abscess involving 4 in. of the upper mediastinal space and extending from the left common carotid along the right subclavian artery to the axilla. The right tonsil was removed and a latent peritonsillar abscess drained. Operative findings showed the spread of the tonsillar infection along the cervical clefts. Postoperatively patient recovered after three weeks. (*Deutsch Med. Wchschr.* 55: 775-78. 1929.)

FISCHER, L.—TONSILLECTOMY IN INTERNAL DISEASE

The author reports cases from 1920-1928. Of 245 cases 110 were re-examined in from two to eight years. Two-thirds of the patients were less than twenty-five years of age. Ninety-three per cent of all were permanently cured. Seventy per cent of all rheumatic patients were permanently cured. Acute arthritis and acute infectious rheumatism associated with endocarditis were benefited by tonsillectomy far more than muscular or acute infectious rheumatism associated with endocarditis lenta. Sixteen of twenty-six cases of chronic nephritis were entirely cured and capable of resuming work after tonsillectomy. Of eighty cases of acute nephritis twenty had temporary renal attacks postoperatively, but recovered completely ultimately.

In the author's opinion tonsillectomy prevents the development of acute into chronic nephritis, but it does not influence severe functional disturbance or nephrosis. Postoperative complications reported in six per cent of all cases consisted of pharyngeal erysipelas, acute nephritis, tuberculosis, hemorrhage and rheumatoid pains. (*Ztschr. f. klin. Med.* 111: 688-705. 1929)

## HUNT, W. M.—THE RELATION BETWEEN TONSILLITIS AND APPENDICITIS

The author reviews the literature on the subject from 1895 to date. He credits Sir James Grant of Ottawa with reporting in 1893 the first modern case of appendicitis associated with rheumatism, and Kelynaek in the same year with reporting a case of tonsillitis with secondary appendicitis. The author's own study is based on a series of ninety-five complete cases, operated on for appendicitis at the Fifth Avenue Hospital, New York City, during 1928. In 76 per cent the tonsils were present; in 24 per cent they were removed; 46 per cent presented on admission an acute throat and 54 per cent a negative. The type of appendicitis exhibited was chronic in 63 per cent; subacute in  $6\frac{1}{4}$  per cent; acute in 21 per cent; acute suppuration in  $5\frac{1}{4}$  per cent; and gangrenous in  $4\frac{1}{2}$  per cent. All acute and gangrenous cases of appendicitis had their tonsils and the latter type of case was admitted with a sore throat. These cases presented the more dangerous forms of appendicitis. Cases with a previous tonsillectomy showed less severe involvement of the appendix. Among the thirty-four cases of acute and chronic tonsillitis and peritonsillar abscess  $14\frac{1}{2}$  per cent showed tenderness in the right lower quadrant. From this analysis the author believes it possible that appendectomy may frequently predispose to tonsillectomy. Localization of the infection in the appendical region is probably an expression of systemic lowered resistance by the primary infection. (*Am. J. Surg.* 6: 761-64. June 1929.)

## CALAMIDA, W.—TONSILLECTOMY IN RENAL DISEASES SECONDARY TO TONSILLAR LESIONS (Sulla Tonsillectomia nelle Nefropatie Secondarie a Lesioni Tonsillari)

Renal functioning was determined by the two Koranyi tests of experimental polyuria and concentration capacity. Tonsillectomy was done in thirteen cases of acute nephritis, ten cases of chronic nephritis, one case of glomerulonephritis. Postoperatively eight of the first group were cured, one was arrested, one turned chronic, two of the second group were cured, and one of the third group. The period of after-observation was from six to forty months. No recurrence occurred, therefore the author considers tonsillectomy safe and useful in renal disease—except perhaps in chronic nephritis—provided it is not associated with nephrosclerosis.

The series of acute nephritis includes nine men and four women the ages ranging from four to thirty-six years. The kidney lesion due to tonsillitis had lasted from one to thirty months. Tonsillectomy had cured ten patients and arrested the renal conditions in three.

The series of chronic nephritis included eight men and two women the ages ranging from twelve to forty years. Chronic renal conditions were due to tonsillitis and lasted from two months to five years. After

tonsillectomy two patients improved, in six the renal condition was arrested and two patients died of uremia.

One woman, aged twenty-six, had secondary glomerulonephritis for three years due to recurrent tonsillitis. She was completely cured after tonsillectomy. (*Arch. ital. di otol.* 40: 111-19. Feb. 1929)

MALAN, A.—RELATION OF PALATINE TONSILLITIS TO KIDNEY DISEASES  
(Amygdalites palatines et nephropathies)

Bacterial findings in tonsillitis and peritonsillar phlegmons demonstrated predominantly hemolytic streptococci. The same irritant was demonstrable in embolic infectious renal diseases associated with acute tonsillitis and in diffuse toxic glomerulonephritis associated with chronic tonsillitis.

According to Vollhard the pharyngeal lymphatic ring is the primary focus of infection in 75 per cent of nephritis associated with angina. The author states that 8.3 per cent of chronic nephritis was due to pharyngeal infection; and 44.3 per cent of acute nephritis was associated with pharyngeal infection. Of 2246 cases operated for hypertrophy of the pharyngeal tonsils 0.74 per cent gave a positive renal reaction. Why some cases exhibit diffuse and others focal nephritis is still unexplained, but the author believes that the virulence of the causal bacteria, individual predisposition and systemic immune reaction are probably determining factors. (*L'Oto-Rhino-Laryng. Internat.* 13: 1-5. 1929.)

BERTOIN, R.—NEPHRITIS OF PHARYNGEAL ORIGIN: TREATMENT BY  
TONSILLECTOMY (Nephritis d'origine pharyngée; indications  
thérapeutiques)

The author reports two cases of chronic nephritis in a girl of four years and a woman, twenty-three years old. Both developed acute nephritis after attacks of tonsillitis. Persistent albuminuria suggested a pharyngeal origin. On examination the tonsils were found to be small, recessed, and surrounded by roughened tissue. Tonsillectomy was advised and accepted. Both patients made a good recovery and positively showed at re-examination one and three years later no trace of albuminuria.

The author considers tonsillectomy the best treatment unless contradicted in hemophiliacs. (*Rev. prat. d. mal. des pays chauds* 8: 569-80. 1928.)

MAZZARELLA, G.—RENAL FUNCTIONING IN ACUTE AND CHRONIC  
TONSILLAR INFLAMMATION (La funzionalità renale nelle  
tonsillopatie acute e croniche.)

The author studied ninety-eight cases of tonsillar inflammation, simple hypertrophy without angina, and recurrent chronic tonsillar inflammation. In the first group of thirty-seven cases eleven had glomerulonephritis and renal function was reduced in seven proved by the delayed phenolsulfo-

phthalein test. Postoperatively 100 per cent recovered through prophylactic and dietary therapy. In the second group of twenty-nine cases two had albuminuria, one had glomerulonephritis and one showed moderately reduced renal functioning; tonsillar operation cured two of the nephritis cases and improved one. (*Arch. Ital. di otol.* 10: 395-42, 1929)

#### NUSSBAUM, D.—PYEMIA FOLLOWING ANGINAS

The author fully discusses the pathogenesis, anatomy, diagnosis and treatment of the tonsils. He states their responsibility for 80 per cent of acute and chronic rheumatism, for numerous cases of renal infections, septic endocarditis and chorea. From a survey of the literature he finds 58 cases of post-tonsillar pyemia reported up to 1927, of which 13 only recovered after ligation and total excision of the jugular vein. Claus of Berlin recently reported successful excision of thrombosed veins in gout of twenty such cases.

The author states that post-tonsillar muscular and joint metastases are usually caused by the streptococcus and pulmonary metastases by the anaerobic *Streptococcus putrifrons* strain. He reports no cases.

He considers a streptococcus sore throat particularly alarming because the spreading tissue infection causes peritonsillar and parapharyngeal supuration, while hematogenous infection causes bacteremia, or toxemia, phlebitis or thrombosis. Both blood and lymph streams may carry infection to distant organs and result in metastases. Post-anginal persistent lymphadenitis is, in his opinion, one of the greatest danger signals. With respect to treatment he recommends early surgery under local anesthesia rather than general narcosis, except in markedly toxic cases without thrombosis who do not respond to operation. (*Laryngoscope* 39: 787-95, 1929)

#### LIEBERMANN, TH.—TONSILLITIC CRANIAL PAIN (Tonsillogene Schmerzen am Kopfe.)

The author reports three cases of follicular tonsillitis in adult women, 38 and 40 years of age, who complained on apparent recovery of persistent pain in the nape of the neck, trigeminal neuritis, arthritis, facial and orbital neuralgia respectively.

In all patients the regional lymph nodes were palpable. In one patient appendectomy and extraction of various teeth brought no relief from arthritis, the other patient was not relieved from neuralgia by ethmoid exenteration. In the third patient no improvement of cranial neuritis was had from vaccinenrin and arsenic injections, hot air and x-ray treatment, ethmoid exenteration and irrigation and drainage of the bilateral antra. All three patients, however, completely recovered after enucleation of the tonsils.

The author concludes that in tonsillitic cranial pain tonsillectomy is indicated whenever enlarged regional lymph nodes are palpated. (*Wien. Med. Wchschr.* 79: 1453-54, 1929)

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# OPERATIVE RISKS FROM INFECTION\*

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To cover in the time allotted to me all the possible complications from postoperative infection would result in a catalogue of many important surgical conditions, with only a brief description of each. Any one of the more important postoperative infections, such as pneumonitis, peritonitis or erysipelas, could be the subject of an individual paper. Realizing, therefore, that the subject is much too large to cover with any justice it seemed advisable to limit this discussion to a description of the factors which may lead to infection of a clean laparotomy wound and to discuss thrombosis and thrombophlebitis as one of the general causes of diffuse dissemination of a local infection.

Fortunately, Dr. Martin will discuss bacteremia, Dr. Meleney streptococcic skin and fascial gangrene, and Dr. Pool the various complications of appendicitis, so that many of the sequelæ from postoperative infection will be treated by them.

For several years I had the good fortune to be pathologist in a course of surgical technique given in the Surgical Department of the College of Physicians and Surgeons, Columbia University. In this course, in order to study the repair following laparotomy, animals were autopsied at various times from one to ten days postoperative. I was impressed by the amount of postoperative disturbances in the subcutaneous fat, fascia and muscle that is hidden under a relatively normal appearing skin. These observations have been confirmed during postoperative antopsies on human beings following surgical calamities or after death from intercurrent diseases.

The following\* factors may be suggested arbitrarily as tending toward producing infection in clean laparotomy

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\*Delivered October 23, 1930

wounds: 1. Introduction of bacteria. 2. Trauma. 3. The insertion of foreign bodies in the wounds. 4. Devitalized cells and necrotic tissue. 5. Dead spaces. 6. Tension on the wound, producing a local anemia.

1. *Introduction of bacteria.* One must assume that rarely is an operative wound free from the presence of bacteria. In a recent study conducted by Dr. Kingsley Roberts of my staff, at the Fifth Avenue Hospital, on the bacteriology of wounds, the cultures taken from the knife blade which made the skin incision, showed, in 105 cases, positive cultures in 72.4 per cent and negative in 27.6 per cent. Of the bacteria found there were 10 of the colon bacillus group, 37 of the diphtheroid group, 16 of the staphylococcus group, 10 of the streptococcus group, 8 of the anaerobic spore-bearing gas bacillus type, and 14 miscellaneous.

Similar studies of the peritoneum in clean cases were made. A small opening was made in the peritoneum. Into this was inserted a cotton applicator, and cultures were made before the introduction of any instruments. In this series there were 79 cases; 93 per cent showed positive cultures, and 7 per cent showed negative cultures. There were diphtheroids present in 42 cases, varieties of the staphylococcus in 10 cases, varieties of the colon bacilli in 10 cases, varieties of streptococcus in 14 cases, gas bacilli in 9 and miscellaneous in 22 cases.

Of 79 clean cases where both knife blade and peritoneal cultures were made, the cultures of the knife blade and of the peritoneum corresponded in their general make-up in 62 cases, while in 17 cases cultures of the knife blade and of the peritoneal cavity were entirely different. A plate culture taken after exposure of 45 minutes during the performance of a clean operation showed the following bacteria: 6 varieties of saprophytic staphylococcus, 4 varieties of diphtheroids, one of the colon bacillus group, and 2 of the anaerobic rod-shaped group.

We offer the following theories for the presence of bac-



teria in a clean wound: a. They are air-borne. In a series of severe streptococcic infections at the Presbyterian Hospital, Dr. Meleney and his co-workers traced the origin of the infection to one assistant who was a streptococcus bearer. In a series of very severe pneumococcus III wound infections at the Lincoln Hospital we traced the source to an interne who harbored a virulent pneumococcus III in his throat. This series was not as scientifically proven as the Presbyterian Hospital series. Both epidemics of infections were stopped by compelling all persons entering the operating room to wear masks. This included visitors as well as the nurses, orderlies and doctors.

b. Skin and sweat glands. No skin disinfectant has been discovered which will penetrate the sweat and sebaceous glands, which probably harbor bacteria. After a careful study of the various skin antiseptics in vogue, we adopted, at the Fifth Avenue Hospital, the use of 5 per cent gentian violet and 5 per cent methylene blue in 50 per cent alcohol. This combination showed less growths from so-called clean skin, and from skin on which bacteria had been smeared, than any other skin antiseptic. Nevertheless, it does not penetrate deeply. Therefore it behooves every surgeon to consider the skin as dirty. Towels or pads along the edges of the skin, applied immediately after making the incision, may reduce the number of bacteria from this source.

c. The presence of bacteria either in lymphatics or deep structures before the incision has been made. Bacteria have been grown from tissue cultures that have been made in the depths of wounds: However it seems impossible to rule out their introduction from the skin or air. For the improvement of our operative results it would seem best to exclude this source from our consideration, for should infection occur it becomes an alibi that has no constructive use. In many operating rooms it is the custom to sterilize knives either in lysol or 95 per cent alcohol. Neither of these solutions will kill the spore-bearing organisms, and it has been shown that 95 per cent alcohol is less efficient

than 70 per cent alcohol: Moreover, it is necessary to have the knives in the 70 per cent alcohol at least a half hour to kill the ordinary pathogenic bacteria.

2. *Trauma.* The prevention of trauma in an operative approach is almost impossible. Some surgeons decrease this to the minimum, while the rough ones increase it. In general it may be stated that a large incision is apt to create less trauma than a small one. Where exposure is difficult, the constant moving of metal retractors on unprotected fat and fascia is a constant menace. Many surgeons apply Kocher clamps to retract fascia: These clamps, if left on for any length of time, will destroy this relatively avascular tissue. In attempting to obtain exposure of an organ in the abdominal cavity, the intestines may be severely handled and pulled upon. Coarse string pads are placed to keep the intestines away, and frequently the superficial layer of peritoneum is stripped off when they are withdrawn. Postoperative trauma may be as great a cause of infection of clean wounds as the trauma that occurs during operation. Postoperative vomiting and retching may pull sutures loose and create dead spaces. The use of a Levin tube inserted through the nose is a great aid to prevent immediate postoperative vomiting. When drains have been inserted to control oozing, their removal too early may traumatize tissue before it is protected by leukocytes and open up new spaces for infection. Orr, in his treatment of osteomyelitis, has shown that infected wounds or open wounds do better if they are sealed with a non-irritating dressing such as vaseline and not dressed frequently. Figs. 1, 2, 3.

3. *Foreign bodies.* If one studies through the microscope the repair of postoperative wounds one is surprised to find the amount of reaction about any foreign body. Where silk sutures are inserted foreign body giant cells and leukocytes may be found in their neighborhood a considerable period of time after their insertion. With catgut the same defense action may be seen. Walton Martin has said "Every foreign body implanted then adds in varying

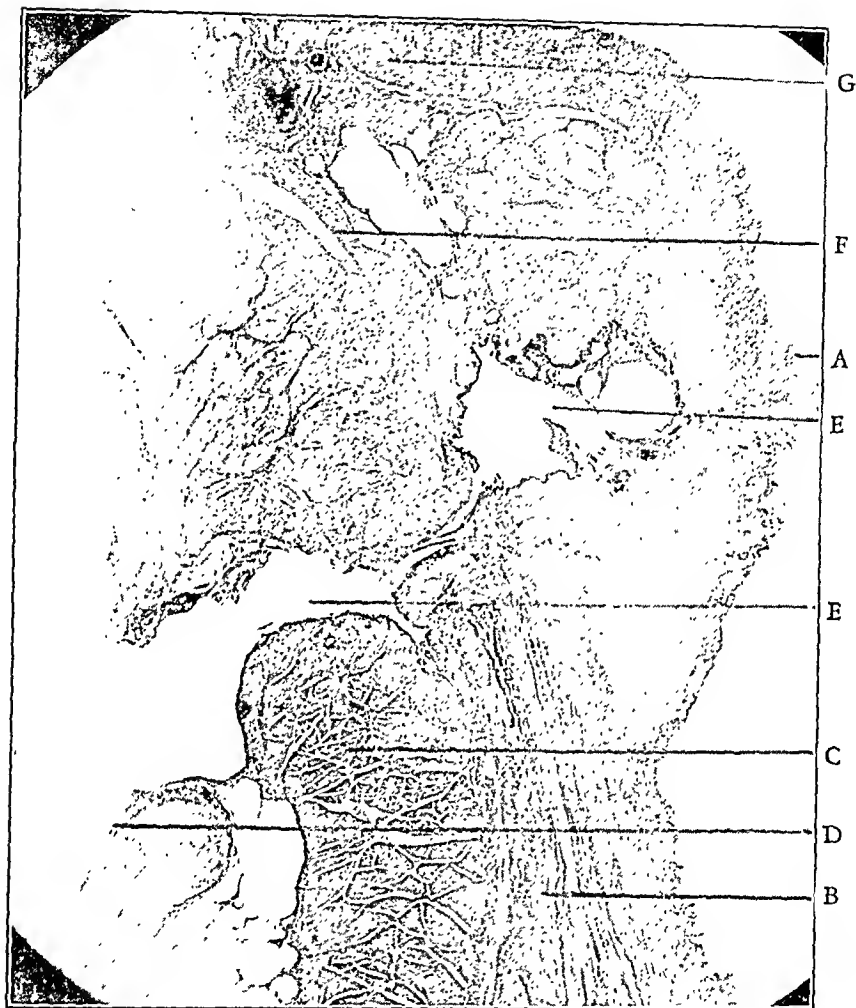


FIG. 1

Fig. 1.—Laparotomy—right rectus incision—dog—sacrificed two hours after operation. Note marked potential dead space and extravasation of red blood cells at a considerable distance from the operative field. a, Skin surface. b, Fascia of rectus muscle. c, Rectus muscle. d, Peritoneum and transversalis fascia. e, Incision. f, Extension of hemorrhage along rectus sheath. g, Area of hemorrhage at a considerable distance from the incision.

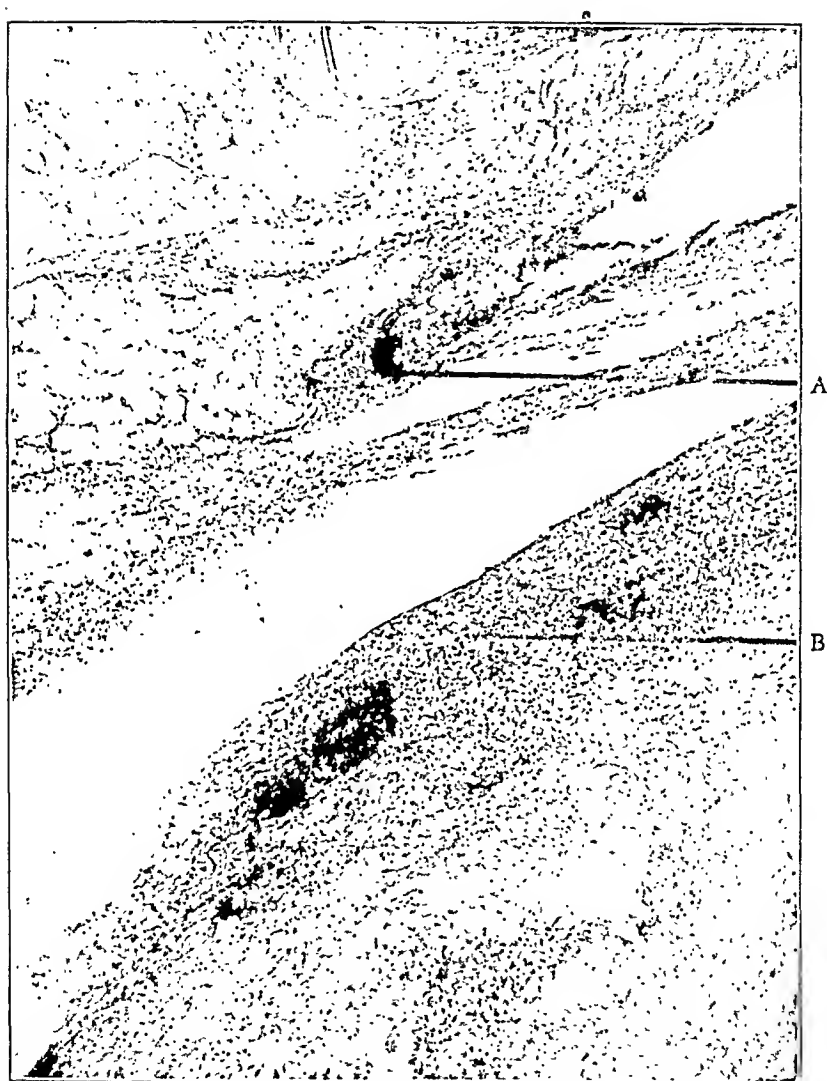


FIG. 2

Fig. 2.—High power view Fig. 1. a, Infiltration of fat with leukocytes and hemorrhage. b, Infiltration of fascia with leukocytes and hemorrhage.



FIG. 3

Fig. 3.—High power view Fig. 1 two hours after operation. a, Silk suture.  
b, Cellular infiltration about silk suture.

degrees, depending on its irritative quality, to the injury of the tissues; uses up, as it were, a certain amount of the defense reaction, and from a theoretical standpoint should make it more difficult for the body cells to destroy or shut in growing bacteria." Where heavy suture material is used to draw tissues together under tension, as in some hernias with large defects, the foreign body suture material, often applied with three knots, is too great an obstacle for satisfactory repair. Where tension is so necessary that large sutures have to be used to maintain apposition it is reasonable to assume that this suture material will cut through the muscles through which it has been inserted. In such cases it would seem rational to make releasing incisions in the fascia overlying adjacent muscles which would reduce tension and allow the use of finer suture material. Figs. 4, 5, 6, 7.

4. *Devitalized cells and necrotic tissues.* The long exposure of cells to drying, as occurs in laparotomies where moist pads are not used for protection, will cause death of these cells. The insertion of mass ligatures on tissues, such as might occur in intestinal and gastric resections, assures a death of cells beyond the ligatures. Dead tissue in a healing wound, with the presence of only a few bacteria which may in general be saprophytic, must certainly predispose toward infection. The surgeon occasionally makes an anatomic dissection of the aponeurosis of a muscle, not realizing this aponeurosis receives its blood supply from the areolar tissue on its surface. In fat individuals one is often surprised, on sponging the wound, to observe the amount of fat that comes away with the sponge. This must be devitalized fat which if left in the wound may become a nidus for bacteria. Before closing wounds in fat people it would seem advisable to irrigate the wounds with ether, in order to remove all loose particles.

5. *Dead spaces.* If one could inspect with a magnifying glass a clean linear incision one would find many small depressions which are potential dead spaces. These be-

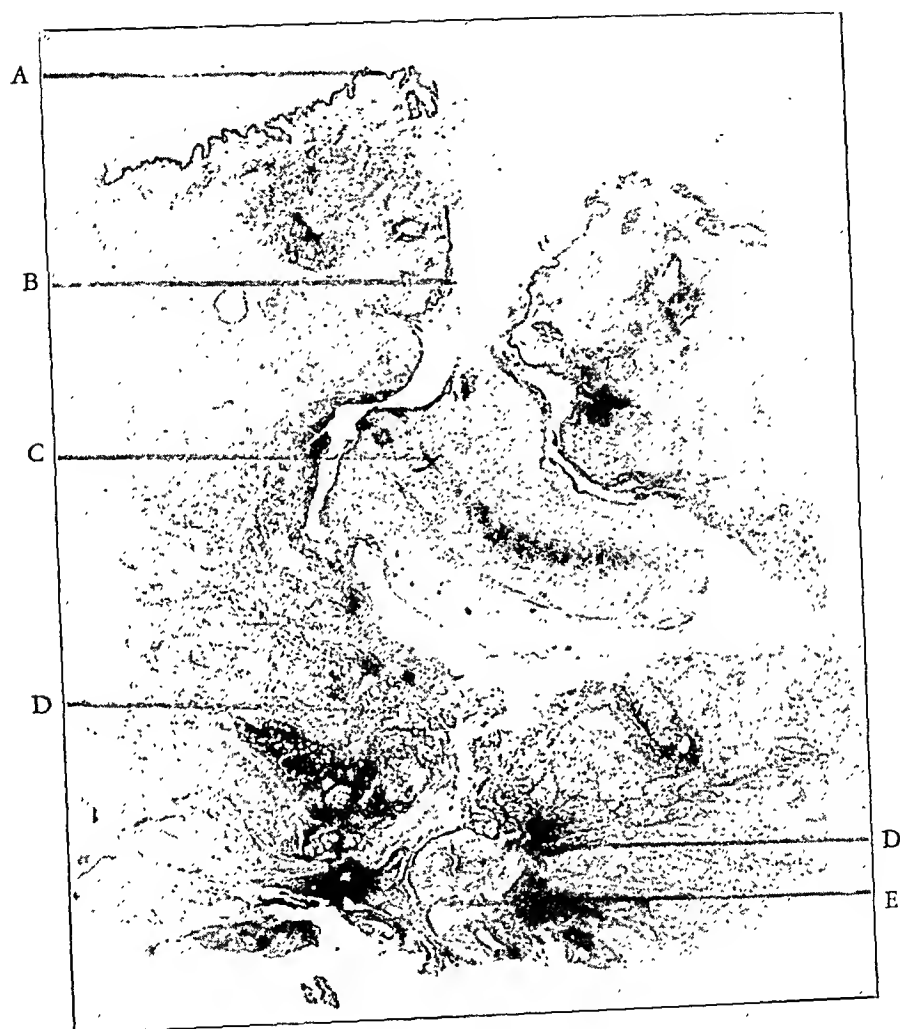


FIG. 4

Fig. 4.—Two days after laparotomy of dog shows inverting of skin surface by Lembert suture, blood clot in dead space, and marked infiltration with hemorrhage of neighboring fat and fascia. a, Epithelium of skin surface. b, Inverted skin. c, Blood clot occupying dead space. d, Infiltration of deep fat and fascia of rectus muscle with hemorrhage and exudate. e, Line of suture through rectus muscle.

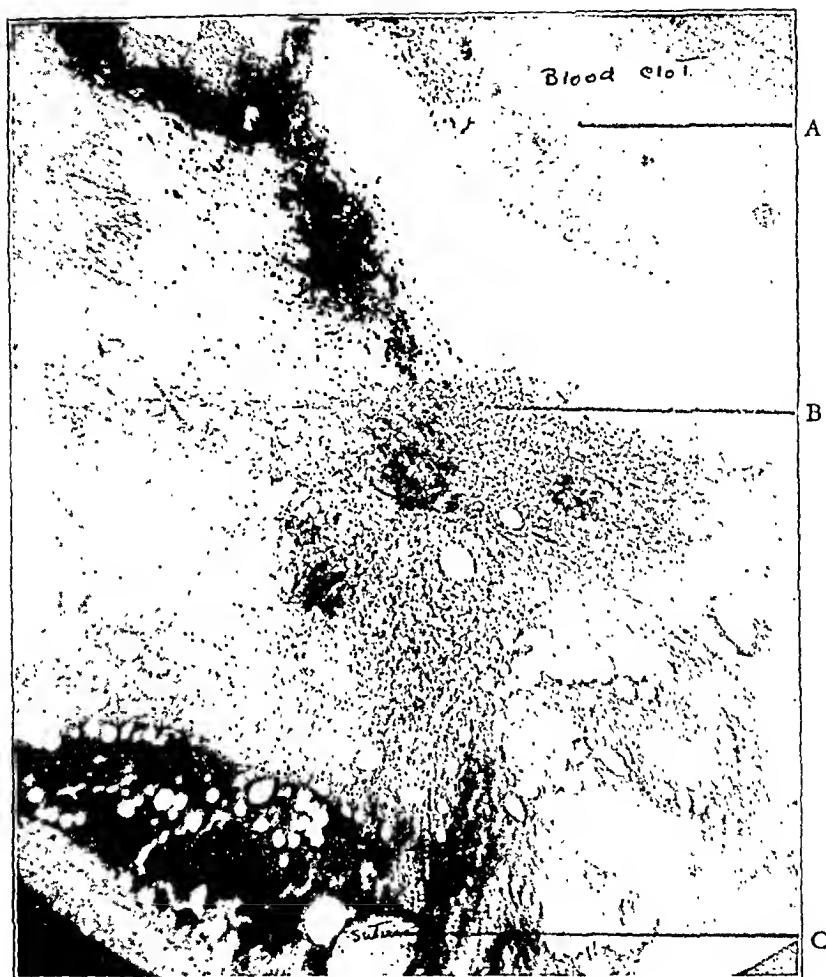


FIG. 5

Fig. 5.—High power view of Fig. 4. a, Blood clot in dead space. b, Hemorrhage in fat. c, Cellular infiltration about suture in rectus muscle.



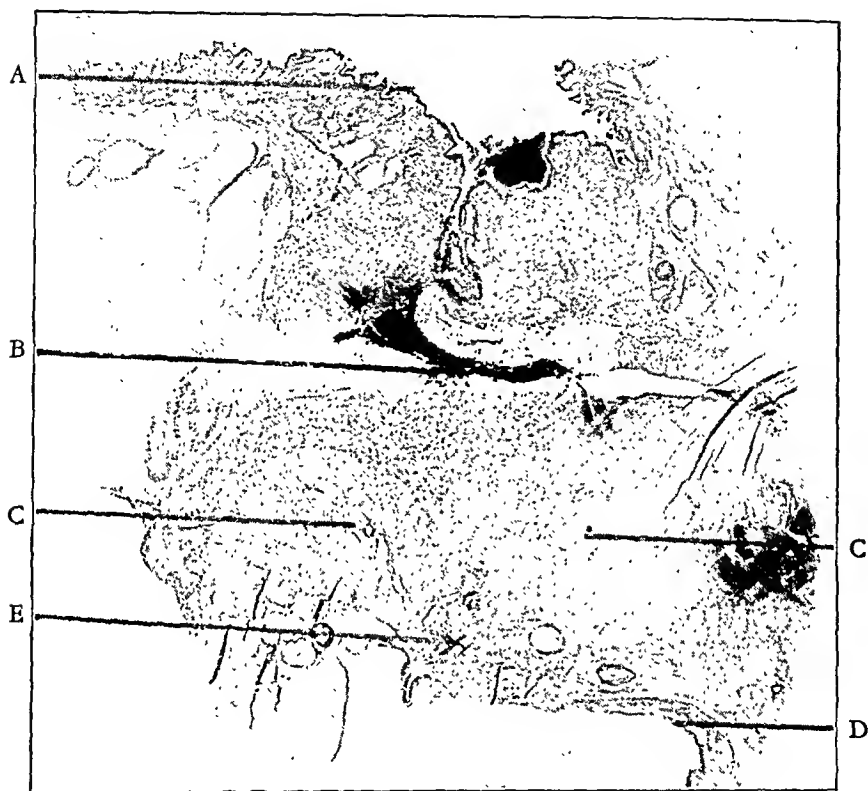


FIG. 6

Fig. 6.—Nine days after laparotomy on dog. Note inversion of epithelium, dead space created by the hemorrhage along the anterior fascia of the rectus and marked cellular reaction about suture line. a, Epithelial surface showing inversion by Lambert suture. b, Dead space created by hemorrhage along anterior fascia of rectus, with infiltration of fat. c, Recti muscles. d, Peritoneum. e, Repair of incision.

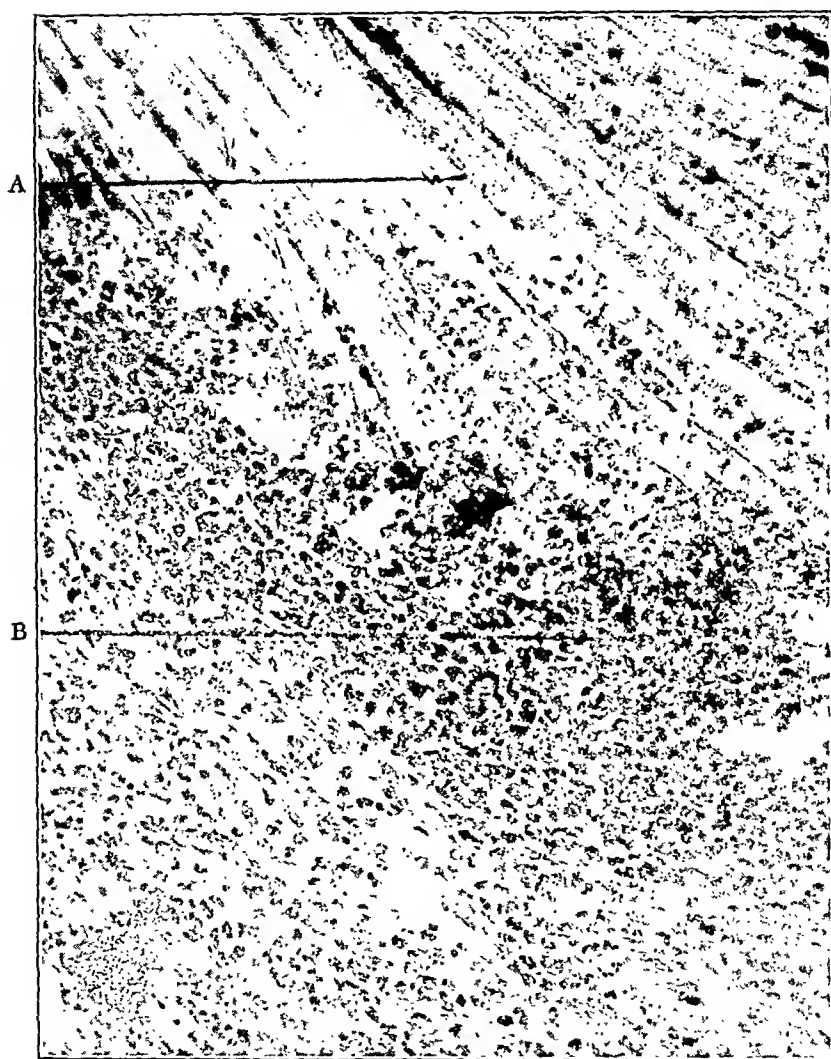


FIG. 7

Fig. 7.—High power view of Fig. 6, nine days postoperative, showing cellular infiltration about silk suture (foreign body.) a, Strands of suture. b, Cellular infiltration.

come macroscopic where large incisions have been made and violent traction has been exerted with trauma to fat and muscles. Wherever a dead space occurs, it is usually filled with either lymph or blood. Stagnant blood furnishes an excellent culture-medium for bacteria. Dorst studied the influence of collections of blood on staphylococcus infection: He found that the disposition to infection was increased about 40-fold by hæmatoma. When bacteria gain access to these pools, whether filled with lymph or blood, they colonize and multiply out of reach of active, living leukocytes, and a condition is created unfavorable to the local defense reaction of the body. The insertion of tension sutures with large cutting needles placed outside the range of vision may tear blood vessels and create hæmatomata. It would seem more surgical if the skin could be nicked with a sharp instrument and these sutures inserted with non-cutting needles. Figs. 6, 7.

6. *Tension of tissues.* One frequently sees on dressing wounds about the fifth day postoperative that the tension sutures have cut well into the skin. If one could visualize the entire depth of this wound one would probably see these sutures had cut through the fascia and muscle and that there was a relatively anemic area within their circumference. The anemia delays healing and may predispose toward infection. Too tight abdominal dressings applied at the time of operation, with a resultant distension of the intestines beneath, may create local wound anemia.

It is a general surgical impression that inguinal hernias furnish the highest percentage of infection in clean wounds. In our series at the Fifth Avenue Hospital the incidence of infections in hernia was 1.5 times that occurring following a clean laparotomy through a McBurney incision. The incidence of hæmatomas occurring in hernial wounds was double that occurring in McBurneys. It is common practice in performing hernial operations to use unsurgical principles, which might readily account for this increased incidence of hæmatoma and infection. It would

seem advisable to mention the most important: In attempting an exposure of the external oblique aponeurosis the areolar tissue is sometimes dissected free from its external surface. Then after incising the aponeurosis the areolar tissue is wiped off the internal surface downward as far as Poupart's ligament and mesially to the rectus muscle. The aponeurosis of any muscle receives the greater part of its vascular supply from the areolar tissues on its surface. In this operation, then, in order to preserve the vascularity of the external oblique aponeurosis the areolar tissue should not be disturbed on its external surface. The sac is often dissected free roughly from the cord, producing a great deal of tissue trauma. The ligation of the neck of the sac with double heavy ligatures with a good deal of tissue beyond the ligature bite leaves an area where there must be considerable cellular death. The conjoined tendon or the rectus muscle, according to the type of hernial operation used, is usually united to Poupart's ligament with interrupted sutures, frequently of considerable size. These sutures may be tied with more tension than is needed to approximate the fascial surfaces. Moreover, the operator, in order to prevent recurrence, is apt to use three knots—introducing a large foreign body in an avascularized area. After the aponeurosis has been closed with or without the transplantation of the cord, the skin is frequently closed without suturing Scarpa's fascia. In this region Scarpa's fascia is one of considerable moment, as it has sufficient tensile strength to be a factor in extravasation of urine. If it is observed just before closure of the skin, there will be found a hiatus of 2 or 3 cm. beneath the edges. Should the skin be closed without this suture there remains a triangular dead space.

The adoption of a careful, non-traumatizing surgical technique will do much toward reducing infection in clean abdominal wounds.

Thrombosis and embolism have become relatively more important in the surgical world as the improvement in technique has diminished many other types of complica-

tion. The sudden exodus of a patient five to fifteen days after operation, often occurring as preparation is being made to leave the hospital, is a surgical calamity of inestimable moment. Strangely enough little has been done to discover the cause and thereby diminish the incidence of thrombosis and embolism. Various clinics have made statistical reports, and we know the incidence is higher in certain abdominal operations than elsewhere.

It is generally accepted that trauma, infection, slowing of the blood stream and increased dehydration of the blood are factors in producing thrombosis: Nevertheless, patients may develop thrombosis with a minimum number of the above factors, while others with a maximum number remain unscathed. For this reason we decided to study, at the Fifth Avenue Hospital, the blood-clotting factors of all patients admitted to the surgical service. The studies of the prothrombin, fibrinogen and antithrombin content, with the resultant determination of a clotting index, will be given in a later part of this article. We believe, from this study, that we may prognosticate in the case of a patient who is apt to develop thrombosis, and we believe that certain therapeutic agents may be administered that will decrease the incidence.

Clinically one observes three main types of thrombophlebitis: 1. An acute fulminating phlebitis, associated with chills, high elevation of temperature, redness and tenderness along the course of the vein with swelling of the limb. In this type the thrombus may break down and numerous suppurative emboli be distributed throughout the body. In such cases there is evidence of a bacteremia and there may be septic foci in almost any organ. 2. The acute thrombophlebitis, associated with a moderate elevation of temperature, swelling of the limb and pain. The temperature may persist for five to fifteen days, associated with pain and swelling. As these cases are usually observed early and precautions taken, the emboli are not as frequent. A clot in the vessel wall may become organized and the lumen entirely occluded. Return circulation of the leg is

accomplished by either compensatory dilation of the superficial veins or a canalization of the thrombus and the subsequent reestablishment of the blood supply through the affected vein. 3. Silent thrombosis. It is probable that there is very little thrombophlebitis associated with silent thrombosis. It is this type, running a relatively normal postoperative temperature, having a sudden massive embolus occluding large vessels, with resultant death, that is the most distressing to the surgeon, to the family and the public at large. It is with particular reference to this type that we have attempted to study the blood-clotting factors involved.

It would seem advisable at this time to enter into the philosophic discussion of the causes of postoperative thrombosis and thrombophlebitis. Analytical reports from surgical clinics tend to show that these conditions are more prevalent following operations upon the lower abdomen and in fat people, and rarely do they occur following operations on the brain and skull. One may ask why this should be, for many large veins must be traumatized in skull operations. I venture to suggest the following factors concerned in their etiology:

a. In abdominal cases where the surgical approach has been through the abdominal wall there is constant motion in the field of repair during the first 48 hours; in operations on the skull, with the rigid skull cap, the field is kept at rest. With every breath taken and with the usual postoperative nausea and vomiting there is a constant thrust and pull on the operative field: This might easily dislodge an embolus or cause an extension of a small thrombus retrograde into a larger vein.

b. The approach for an abdominal operation is through an area of subcutaneous fat, while in skull operations there is a relatively small amount of fat. With the insertion of sutures, often under too great tension, and with the application of a tight abdominal dressing, necrosis of the traumatized fat may result. Experimentally we have found in dogs that if fat is taken from the subcutaneous tissues

or the omentum and ground up with a small amount of saline in a mortar, the resultant fluid contains approximately 2-4 per cent fat. When this emulsion is injected intravenously a marked rise in the blood-clotting index is produced.

c. Slowing of the blood stream. Since Welch's classical discussion of thrombosis and embolism in Allbutt's System of Medicine almost all pathologists and surgeons have accounted the slowing of the blood stream as one of the primary factors in the production of thrombosis. It has been shown that thrombosis rarely occurs in arteries because the circulation of the blood is too rapid. Experiments have been performed inserting formalin-prepared arterial segments in arterial defects without subsequent thrombus formation. Pathological specimens of aneurysms have shown that thrombosis occurs in the portions where there are eddies; but where a dissecting aneurysm has allowed a rapid flow of blood, thrombosis has not occurred.

Following abdominal operations it has been an almost universal practice to apply tight surgical dressings. The distension which usually follows 24 hours postoperative causes a marked increase in intra-abdominal pressure. If we consider that the return flow of blood in the vena cava is largely due to the suction of the heart and the respiratory movements, this increased abdominal pressure and splinting of the diaphragm must cause considerable stasis in the veins of the lower extremities. Moreover, with the almost universal use of the Gatch bed in the Fowler position we have the double factors of gravity and constriction in the region of Poupart's ligament, increased by the flexion of the thighs and by the lower border of the tight dressings.

d. Infection. Infection or the presence of bacteria or their by-products in the blood stream is generally advanced as another contributing factor in the production of thrombophlebitis and thrombosis. These complications may occur where, to all apparent gross observation, the operative wound is healed per primum. We know that bacteria enter

the blood stream through the intestinal walls. With post-operative distension and slowing down of peristalsis, the bacterial flora of the intestinal canal must multiply to a marked degree. Moreover it would seem probable that, with the thinning out of the intestinal wall due to distension, more bacteria might enter the blood stream.

e. Dehydration, with resultant increased viscosity of the blood, is another factor mentioned as an etiological cause of thrombosis. It is hard to estimate in the first 48 hours postoperative the increase of fluid output over the fluid intake. With preoperative purgation, increased sweating due to postoperative elevation of temperature, vomiting and urination, the fluid output is tremendously increased; at the same time the intake of fluids is markedly diminished. If a patient is vomiting the oral method of intake is almost impossible.

f. Blood-clotting factors. In the beginning of our study of thrombosis and thrombophlebitis we were impressed with the fact that some patients with a minimum number of the known predisposing causes had thrombosis occur, while others with a maximum number escaped. For instance, a woman of 38 years, after resting her arm on a desk for four hours while collecting tickets at a moving picture theater developed phlebitis of the basilic vein of the arm. As a contrast we could cite numerous cases of war injury where there was infection, vascular injury and slowing of the blood stream without resultant thrombosis. This striking contrast convinced us there might be something in the blood-clotting factors inherent in an individual that might be an unknown agent in the production of thrombosis. We decided therefore to study the clotting factors of each patient admitted to the staff service of the Fifth Avenue Hospital. At the beginning we analyzed the antithrombin index, the prothrombin index, fibrinogen, platelet count and the rate of platelet dissociation. As the platelet count is greatly influenced by chronic infection we have recently discarded the platelet count and the platelet dissociation rate from consideration. As the pro-



thrombin and fibrinogen hasten coagulation and anti-thrombin retards coagulation, a blood-clotting index has been formed of which prothrombin and fibrinogen are the numerators and antithrombin the denominator. The detailed description of the tests has been published in an article by Bancroft, Stanley-Brown and Kugelmass in the *Annals of Surgery*, August, 1929. It would seem inadvisable to take up these details at the present time. As the normal prothrombin is 1.0, fibrinogen is 0.5 and antithrombin is 1.0, the index then becomes  $0.5 \pm 0.2$ .

Blood examinations have been made preoperative and, at first, three and five days postoperative. Lately the postoperative examinations have been changed to five and nine days. Since the onset of this work the blood of 965 patients has been examined. Not all of these, however, had preoperative determinations, as some of the cases have been referred from the medical clinics and also examinations have been made elsewhere on patients suffering from fully developed phlebitis. We have considered any patient with a blood-clotting index of over 0.9 as having a clotting tendency. In all, we have studied 25 patients who have had clearly demonstrable thrombosis, thrombophlebitis or embolism. With one exception these have had high clotting indices. About 20 per cent of all the patients examined have had high clotting indices but have not developed an obvious thrombosis: Nevertheless, almost without exception all of these patients have run a rather high postoperative temperature. For instance, a hernia occasionally would run a temperature ranging from 99 to 100 for 12 to 14 days postoperative, without obvious wound infection or evidence of external phlebitis. Hysterectomies or gangrenous gall bladders tend to have high indices, and we have felt that they probably had a concealed thrombosis or thrombophlebitis and came into the thrombosis class, but we have not classified them, in our analysis, as such.

We have been able to prove experimentally on animals and humans that there is only a slight postoperative rise in the blood-clotting factors in uncomplicated surgical pro-

cedures; but if a gangrenous process with thrombosis associated therewith is produced, the clotting factors rise.

We have had three patients with high clotting factors either before operation or shortly afterwards who have developed either thrombosis or embolism. Allow me to cite two illustrative cases:

Case 1 was a patient admitted for gall bladder pathology. She had high clotting factors on admission. Because she had not seemed to us to be a satisfactory risk, operation was not considered and the patient left the hospital. She returned later to the medical side, with symptoms suggesting pellagra and was placed on a high protein diet. A month later she was admitted to the hospital with a bilateral femoral phlebitis.

Case 2. A patient was operated upon for cholelithiasis and benign polypi of the stomach. The operation of cholecystectomy and gastrotomy for the removal of the two benign polypi in the pyloric end of the stomach was performed. On her fifth postoperative day, when her temperature was practically normal and her convalescence apparently satisfactory, she had a high clotting index. On the night of the sixth postoperative day she got out of bed to go to the toilet, fell and struck her right arm. The following morning there was definite evidence of an embolus in the right brachial artery. An embolectomy was performed and the blood flow apparently reestablished, but the patient died from shock, the following evening.

In our animal experiments it has been shown that an acid diet with high nucleo-protein and fat content will increase the clotting factors of the blood while a basic diet omitting as far as possible proteins and fats will diminish the clotting factors. We have also been able to demonstrate this clinically on human patients.

We feel that this experimental work on the blood-clotting factors is still in a very indefinite state. The tests for prothrombin, antithrombin and fibrinogen are complex and are not practicable for routine examinations in a general

hospital. It is our hope that we may be able to simplify this procedure in the future and so adapt it that it may become a routine test even with a relatively unskilled technician.

### TREATMENT

If we base our treatment upon our theoretical concepts of the etiology of thrombosis and thrombophlebitis, the following suggestions are offered for your consideration: 1. In abdominal cases every effort should be made to reduce the postoperative nausea and vomiting, in order to keep the abdominal wall and field of operation quiet. In peritonitis and in high upper abdominal cases the Levin tube inserted through the nostril immediately after the patient has regained his consciousness, greatly reduces vomiting. 2. The approach for an abdominal operation is usually through a layer of subcutaneous fat. Experimentally we have found that intravenous injection of emulsified fat increases markedly the blood-clotting factors. Care should therefore be taken to avoid traumatizing the fat by overzealous pull of the retractors. The irrigating of the fat with ether before closure would seem advisable in order to dissolve out the free fat particles. 3. Slowing of the blood stream, and 4. Infection. Pool in 1913 published an article on *Systematic Exercises in Postoperative Treatment*, in which he illustrated the type of exercises to be used, and recommended that treatment be started on the third postoperative day. The motion of the arms and legs would in no way interfere with the healing of the wound, and would tend to improve the circulation.

In our opinion tight abdominal dressings should be eliminated. G. W. and Kingsley Roberts, of the Fifth Avenue Hospital staff, for years have not used any abdominal dressings and have concealed their wounds with court plaster strips. They have been able to show that their incidence of evisceration or infection has not been greater than when tight dressings are used. It is our custom to apply sufficient gauze to cover the incision and to hold it in place with merely enough adhesive plaster to prevent its moving.

No attempt is made to apply pressure, and no abdominal binders are used. During the three years this procedure has been followed there has been only one case of wound evisceration, which was due, I believe, to other causes. The patients are infinitely more comfortable and their upper abdominal distension is certainly less. It has been our custom on the first day postoperative to inspect all dressings, and any that feel the least bit tight are loosened so that the patient is comfortable. Even with dressings applied loosely at the time of operation one is often surprised to see an expansion of at least an inch after cutting the adhesive the first day of postoperative.

We believe that distension is lessened if food is given early. Theoretically it is logical to assume that if no food is present in the intestinal tract there is no stimulus for peristalsis and fermentation will take place. If a bolus of food enters the intestine there is stimulus for peristalsis, which will carry with it gas as well as solid material. In non-complicated cases, after spinal, ethelyn or gas anaesthesia, the patient is routinely given tea and toast the afternoon following the morning operation.

5. Dehydration. Fortunately in most clinics the giving of active catharsis the night before operation has been omitted from the preoperative preparation. Active catharsis, which tends to dehydrate a patient and make the night before operation uncomfortable with cramps, is unnecessary. A mild catharsis given two nights before operation and an enema the evening and morning anteoperative are sufficient to allow almost any operative procedure in the abdomen. The routine administration of fluids either by intravenous or subcutaneous methods will aid toward diminishing postoperative dehydration. Some authors have suggested the intravenous administration of glucose might be one cause of the increased incidence of thrombosis: Experimentally we have been unable to find any increased clotting factors after glucose administration.

6. Blood-clotting factors. From our studies of the clinical cases and of the blood-clotting factors we have

come to believe there are two types of thrombosis of the lower extremities: a. The more or less silent type, with slight elevation of temperature but associated with swelling of the leg and definite venous obstruction. b. The septic type, associated with high elevation of temperature, infection and occasionally bacteremia as the predominant characteristic. Arbitrarily we have attempted to treat each type as a separate entity:

Type a, with thrombosis as the predominant factor, has been treated by sodium thiosulphate. Although a non-protein diet is successful in reducing a high clotting index, it cannot be depended upon in postoperative cases, for it is in this group that a quick reaction is often needed to prevent an accident. We therefore began to look for some drug which, given intravenously, would rapidly reduce the index, especially in the group in which the prothrombin was high and the antithrombin low. Sodium citrate was naturally considered, as it is such a well-known agent for keeping blood fluid. Our results were good, but large amounts were required and unless great care was used in buffering the solution bad reactions were frequent. At the suggestion of Dr. Lieb, of the Department of Pharmacology at Columbia University, we tried sodium thiosulphate. They had used this in large doses on animals when they wanted to prevent clotting in extra-corporeal tests on the circulation. We found that it was necessary to give only 10 c.c. of a 10 per cent solution and repeat the dose in 24 hours to obtain the desired effect. Larger amounts can be given safely, but are not needed. We have used it now on 15 cases, 6 of which had some form of phlebitis or thrombosis, and 9 received prophylactic doses as the index was found high following operation. In all but one of these cases the index dropped, the main effect being to lower the prothrombin and raise the antithrombin. In one case which did not respond, the prothrombin was normal and only the fibrinogen high. The chemical action is not known but it is probably due to the sulphate combining with the ionizable calcium and preventing its action

with the prothrombin: This, however, is entirely theoretical.

In the cases where sodium thiosulphate has been used after the onset of thrombosis there has been marked clinical improvement: Decrease in pain and swelling of the leg and lowering of the temperature has occurred usually in 24 hours. One case with recurring attacks of phlebitis had a markedly aborted attack as compared with her previous ones.

Type b, with thrombophlebitis the predominant factor,—Following the report of Shallenberger, in a paper read before the Southern Surgical Association in 1924, we have used the intravenous injection of gentian violet solution for this type. Shallenberger advised the use of 0.5 solution. The gentian violet crystals are dissolved in sterile, freshly distilled water, the solution filtered and injected. The maximum dose is 5 mg. per kilo of body weight: This is approximately 46 c.c. of a 0.5 per cent solution for each 100 pounds. It has been our custom to inject 50 c.c. in the ordinary patient and repeat the dose alternate days for two or three doses. We have been impressed by the satisfactory results obtained therefrom. Chills have occurred in one or two cases, but of small moment. The relief from pain has occurred usually following the first injection and we have noted in two cases a decrease in the circumference of the leg of 1 to 2 inches in from 3 to 4 days. One patient who had a severe infection 20 days postoperative had an evening temperature of 103° four days before the injection. She was given 46 c.c. of a 0.5 per cent solution. At that time her thigh measured 24 inches and her calf 14 inches. That night her temperature went to only 100.8, and from there on returned steadily to normal. The second dose of 50 c.c. of the 0.5 per cent solution was given five days later. Four days after the first injection the thigh had decreased 2  $\frac{3}{4}$  inches and the calf one inch, and they were of normal consistency and color. Two months after the operation there was no evident swelling of the leg. We feel that in the septic type of thrombophlebitis gentian violet is a therapeutic agent of considerable value.

During the three years we have used the above mentioned prophylactic measures we have not had a sudden death from embolism.

Walters, of the Mayo Clinic, has advised the routine postoperative use of thyroid extract to prevent thrombosis and embolism. His results in the series published are very encouraging: We have not had sufficient experience with this method to form any opinion of its value.

### CONCLUSIONS

1. The application of surgical principles, such as the avoidance of trauma, the obliteration of dead spaces, and the prevention of postoperative anemia of wounds, should reduce the incidence of infection.

2. Experimental work on the blood-clotting factors associated with thrombosis and thrombophlebitis suggests that there may be inherent in an individual a predisposing tendency in addition to the generally accepted factors of infection, slowing of the blood stream, trauma and dehydration. This work is in its infancy and is suggested as a possible prophylactic solution of a surgical calamity.

## PRESIDENTIAL ADDRESS\*

JOHN A. HARTWELL

Before presenting the report of the activities of the Academy during the past year, I wish to express to you my very great appreciation of the honor that you have done me in electing me to the Presidency for a second time. The Academy has reached such a predominant position of influence that this is an honor one cannot accept without a deep sense of responsibility.

In addressing you two years ago I voiced the hope that whatever qualifications I possessed for this office might be stimulated to the utmost by the example of the Fellows. That hope has been fully realized. There are now over two hundred Fellows who are actively engaged in rendering service to the Academy, and through the Academy to the community.

Without exception, the Administration has never failed to get coöperation from any Fellow upon whom it has called; and the call, in many cases has been for continued, hard work.

I wish to express to you my personal thanks as well as those of the Council for this response and in the presentation of what has been accomplished during the past year and what our aims are for the future, I trust that you will find ample repayment for the very active support you have given. I have previously said that there lies in the New York Academy of Medicine an influence upon the practice of medicine which will be far reaching. My two years of closer association with the activities of the Academy have convinced me that I had only visualized a small part of what may be accomplished. It has been my privilege to work with nearly every one of the committees and many

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\*Delivered at the Annual Meeting of the Academy, January 7, 1931.



of the individual Fellows; and from them I have learned much concerning the inherent force in this institution.

Every undertaking must have a leader. The Academy can and should be the leader in the betterment of medical practice in every way that offers itself. Much fear is at present expressed that the doctors are losing control of their own destiny; that lay bodies and the State are tending to become our dictators and that our freedom of action is being taken from us. If there be any ground for such fear, this Academy is so situated that it can accept the challenge and demonstrate the ability of the medical profession to shape its own course on a road of sound endeavor.

The formal reports of the Council and the various committees cannot fully translate into words the initiative, the study and the planning that are behind this work; and it is these, in the end, which will solve our problems. The practice of medicine has not escaped the disturbing influences which are appearing at this time, in all human activities. A reading of books, magazines and the daily press only too surely demonstrates that almost everything of the accepted order is under attack. There is abroad a spirit of skepticism and unrest. If one analyze this trend, as far as the practice of medicine is concerned, certain outstanding factors are brought to light. The knowledge of biological processes has advanced and is advancing more rapidly than it can be assimilated and applied to the complex matter of maintaining good health and restoring it when lost. The laity are impatient at this. Knowledge of vitamins and endocrines should, in their belief, immediately be translated into good health. Immunity, vaccines, allergy are terms to which great hope is hung, and when this hope fails the doctor is blamed. Promising leads are exploited and fail. Therapeutics become disordered and fashions of treatment follow one another in rapid succession, often with insufficient factual basis and not infrequently because of a very clever commercial propaganda which offers the laity and the doctor a wholly unjustified

hope. Every physician is driven into limiting his activities to a comparatively small field. Even then he constantly finds himself faced with problems of public and individual ill health which tax his resources and to which he finds great difficulty in applying accepted facts which the scientific investigators have established. To meet this situation he constantly is confronted with the necessity of calling to his aid other doctors. Thus the specialist was called into existence and, once created, the growth of specialism has been rapid and largely uncontrolled. It is now necessary to review this situation and place the practice of the various specialties in the hands of men who are competently and completely trained. As will develop later, the Council and its various committees have given much consideration to this problem and are making definite recommendations to the Academy for adoption.

Critics of the medical profession call attention to the fact that there exist in organized medicine no means by which the patient is able to be well guided in the selection of his physician. Reasons for this are partly the responsibility of the doctors and partly of the patients. It is true that as at present organized, the State licenses a practitioner of medicine and thereafter exerts no control over him whatever, unless he be guilty of a felony. He is at complete liberty to undertake the care of any type of patient and to institute any therapeutic measure that he deems advisable. If the public, therefore, is to be served in the best way, it is necessary that it should have information that will permit the selection of a physician who is fully fitted to meet its requirements. The furnishing of this information would seem to be a function of the profession itself. Some thought has been given to this matter by the Council but, as yet, no satisfactory procedure has evolved and the Council has been unwilling to take any action. Further study of this complex problem ought to yield very definite results, in setting up some sort of a clearing house where such information may be readily obtained. To some of us, the Academy seems to be ideally fitted to undertake this function and it is the hope of your

President, at least, that such an end may be accomplished. The responsibility of the patient in this matter, lies in the fact that individuals are more often than not curiously unintelligent in the selection of a doctor. The chance remark of some friend or mere acquaintance quite often determines this choice. Moreover, the patient or his friends not infrequently make a diagnosis of the illness and if, in their opinion, this chances to fall in a special field, they seek out someone of whom they have heard, often in a very indirect way, as being a specialist.

One solution of these difficulties would be a return to an earlier practice, when every family had a definite medical advisor who was trained in the field of general medicine, with a sufficient knowledge of special fields to know when the condition would be benefited under the care of a specialist. Unfortunately this man, the family doctor, has gradually been crowded to the wall somewhat, by the uncontrolled development of specialism. Careful observers, happily I believe, see a swinging of the pendulum and express the opinion that the man of general, sound information, engaged in the care of entire families, is beginning to play a more important part in the scheme of things, than has been the case in recent years.

Many publications, both by members of the medical profession and the laity appear at the present time more or less strongly urging the necessity of State and Federal control of the practice of medicine. A careful study of much of this fails to impress one with the belief that the argument is carefully thought out. There can be no gainsaying the fact that, in the last analysis, the health of the community and of the individual is a matter of public concern in which every individual whether well or ill, has an active and definite interest. It cannot be denied that illness, as such, is a charge upon the entire community, directly or indirectly; that enormous sums of money are expended in an effort to maintain good health; and that, under ideal conditions, this amount could be greatly reduced. The State already has a very active part in this

work; and we believe, many statements to the contrary notwithstanding, that the medical profession as a whole, is solidly behind the State and Federal government in every effort to diminish individual or public ill health.

The accusation is made that the individual doctor is little concerned with this endeavor and the more cruel accusation is made that his unconcern is stimulated into active opposition because of the fear of financial loss.

It is true that many doctors, because of the lack of proper emphasis in the medical college curriculum, have not developed a broad view of the possibilities of preventive medicine and the public health as entities. To say, however, that they are not interested in these things and that they place themselves in opposition to real progress because of an ulterior motive, is, I believe, far from the truth. If organized medicine oppose itself, at the present time, to governmental control of the practice of medicine, it does so only because it is not convinced that either individual or public health would be, thereby, conserved.

Doctors are fully informed as to the increasing interest of the State and Federal Government in these fields. They are seriously concerned in having this interest encouraged and made more efficient. They, however, believe that this latter can only be accomplished by a carefully studied, evolutionary development and not by any sudden jumping into a complete State control of all medical activities, in which the doctor becomes, in a large measure, an employee of the State with the personal relation between him and his patient reduced to a minimum.

The British Medical Association states that it has been giving serious consideration to this problem for thirty years. It has evolved a plan, for use in Great Britain, which was published as a supplement to the British Medical Journal of April 26, 1930. The hub upon which this entire plan centers is the increased importance of the family doctor. Whether the patient be entirely independent and financially able to bear the full responsibility and cost

of illness, or whether he be at the other end of the social scale, the relation between the doctor and patient shall be personal and individual, without the intervention of any third party. The report states that

"the medical service of the community must be based on the provision for every individual, of a general practitioner or family doctor" . . .

"Insofar, however, as the individual doctor can promote the prevention of disease, this can best be secured by associating every general practitioner with the general health service and emphasizing on every possible occasion the fact that there is no real line of demarkation between the preventive and curative branches of professional work" and "that a satisfactory system of medical service must be directed to the prevention of disease no less than to the relief of individual sufferers."

I believe that organized medicine in this country will be found entirely in accord with these statements and that it will fully coöperate with governmental agencies in putting them into effect. The problem, however, is too complex to permit of a sudden transition from long established custom to a revolutionary change that would be in need of constant revision.

It is my belief that there are forces in the New York Academy of Medicine that can very materially help in the advance of further wise control of the practice of medicine by the State. But I also believe that the Academy will stand firmly against being stampeded into something that does not give complete promise of success and that will make the practice of medicine a politically controlled profession, with all the evils that may thereby result. Our present course of bringing the State, the County and the municipal departments of health into active coöperation with the doctor in private practice is a wise one and has the encouragement of organized medicine. The anti-diphtheria campaign, carried on by the five County societies and the New York City Department of Health, proved most successful and is a striking example of the proper way to proceed in using governmental forces in the practice of private and public medicine.

It is stated, and with much reason, that under the present regime it is only the favored few in the medical pro-

fession who have the opportunity to develop to their fullest ability. It is well accepted that teaching, with the associated hospital and out patient training under proper supervision and the opportunity for guidance in research problems are potent factors in forming the leaders of our profession. Under our present system these opportunities are available only to a certain number and it is the man of unusual initiative, or who is placed in a position of advantage over his fellows, who is able to get these opportunities in full measure. The rank and file of the profession find them so difficult to obtain that they can neither afford the time nor the energy to enjoy them. The situation is this:

Approximately one hundred million dollars is invested in this city in the conduct of undergraduate medical education and the associated research that goes with it. This education carries the prospective physician to the point of receiving his medical degree and his licensure by the State. Thereafter there is no requirement that his education should be continued except as he gain it from day to day in his daily activities, without supervision. As stated, the fortunate few become associated with the teaching institutions and the well organized hospitals where their opportunities for educational advancement are great. It is with those less fortunately situated that we should be concerned.

It seems economically unsound to expend such sums of money in bringing the young man to the door of the medical profession and then, at the most crucial period in his career, let it be a matter of chance as to whether or not he shall be further developed to the maximum of his ability and placed in a field where this ability may be the best utilized.

New York City is unequalled in the opportunities afforded in our various institutions for carrying on the continued education of the doctor. These are not well organized; they are utilized only in small part and are largely going to waste because no one has given serious consideration to their development or to the responsibility

of making them available to a much greater number of the medical profession.

Through its Committee on Medical Education, the Academy has instituted a beginning in their utilization by studying the facilities that are offered and organizing them so that some instruction under proper supervision can be given. It has already succeeded in interesting fifteen of our hospitals in these problems and a willingness is shown to give additional opportunities for training in the various fields. This, we hope, is the entering wedge. If we are successful in procuring the necessary funds, the New York Academy of Medicine may well become a Foundation in the continued education of the medical practitioner.

This would be accomplished by making the facilities for such education in our many institutions fully available to the practitioner under conditions of which he could readily take advantage. There is general knowledge that in too many instances the internes in the hospitals are looked upon as aids to the routine work in the hospital with little appreciation of the fact that they should receive constant instruction as the future doctors on whom the people depend.

This is a situation that calls for action and could easily be rectified under proper stimulus. If these various changes can be put into effect there would result a betterment of medical practice both in and out of the hospitals as applicable both to the individual and the public.

It is estimated that this will require an additional \$100,000.00 a year. Our goal, therefore, is a Foundation of \$2,000,000.00, approximately 2 per cent of the amount invested in the not more important field of undergraduate teaching.

This is the thought which has stimulated Dr. Linsly Williams, the Director, to push forward with the energy and vision that he has shown during the six years of his administration. He has convinced me that the idea is sound; and the attitude of the various committees that are

taking part in this programme, and the discussion in the Council evidence the fact that the thought is gradually taking shape in all our minds.

We are accustomed to think of the Academy of Medicine as being a library for the benefit of its Fellows, and to a lesser degree, for the medical and lay public; as a place where active medical education is being pushed forward by the Sections; the Academy lectures; the Graduate Fortnight; and a place from which study, guidance and advice on public health problems emanate. The time has now arrived when the New York Academy of Medicine is prepared to broaden its activities in all these fields and to make a serious effort to coördinate outside institutions and individuals in attaining the one aim; namely, to place the science and practice of medicine in this district upon the highest possible plane.

This does not mean that the Academy itself shall be an educational institution or a research body. These belong properly and much more beneficially to the universities. The Academy, however, composed as it is in its Fellowship of the very men who are doing this active work in the universities and in the highly organized hospitals, is in an excellent position to move along the lines indicated with real success.

Our activities during the past year will be detailed to you in the various committee reports and the full report of the Council will appear in the Annual Report. I shall therefore confine myself to emphasizing only those things which have a bearing upon this general development.

Through the Committee on Gifts and Bequests and the special interest of certain of the Fellows, a donation of three hundred and fifty thousand dollars has been promised by Mr. Edward S. Harkness, contingent upon the raising of a four hundred thousand dollar new endowment prior to July 1, 1931. The Council has expressed its very great appreciation for this generosity and further reports that an additional endowment of twenty-five thousand dol-



lars has been made from the estate of the late Mrs. Clinton B. Wagner; ten thousand dollars from Dr. Emanuel Libman for the creation of the William S. Halsted Fund, the income to be used for the purchase of books or for lectures on surgery; of the further generous bequest of ten thousand dollars from the late Dr. James B. Clemens, who for many years was an active member of the Committee on Public Health Relations; and bequests of five hundred dollars each from Dr. Seth M. Milliken and Dr. E. H. Arnold. Finally the Council acknowledges its great indebtedness to an anonymous friend for a donation of fifty thousand dollars toward the general endowment.

These various gifts all go toward the contingent four hundred thousand dollars; and conversations which have been held with representatives of several of the Foundations give us the hope that, with continued effort, we will be successful in meeting the terms of Mr. Harkness' gift.

The Council, at its last meeting on December 17, 1930 showed its confidence in this success by authorizing the appointing of a building committee to take up the question of plans for the construction of the new four story addition to be placed over the auditorium extension. Dr. Arthur B. Duel has been named Chairman of this Committee, with Drs. Alfred E. Cohn, John A. Hartwell, Archibald Malloch, Walter L. Niles, Eugene H. Pool and Linsly R. Williams. York and Sawyer, architects of the present Academy, have been selected as architects for the addition. The main room of this addition is beautifully conceived as the home of our incunabula and rare books, where these may be properly exhibited, studied, and made of living value to the Fellows. Above this will be placed very much needed additional conference and office rooms.

The Committee on Medical Education, as already intimated, has been particularly active during the past year. The Graduate Fortnight was the most successful held up to the present time. The attendance was not only the largest but also the most enthusiastic. Very much favorable comment by educators throughout the country has

been received and it is believed that this exercise will prove of increasing value, year by year. This Committee has taken the lead in studying the problem of specialism and the education and qualification of specialists. A sub-committee under the chairmanship of Dr. Carl Eggers has been engaged in the work for nearly two years and in association with the Committee on Sections, the Committee on Admissions and interested Fellows, a concrete plan was presented to and adopted by the Council at its meeting on December 17, 1930. The Council will later submit proposed changes to the By-Laws which, if adopted by the Fellowship, will make the plan operative.

The proposals have two definite aims. First, to stimulate the activities of the members of the Sections by a form of promotion, and second, to lay down qualifications in the various specialties which will have the approval of the Academy. Conformation to these will qualify a Fellow in the given specialty, and the Academy thereby becomes his sponsor as competent in training and experience to practice such specialty. Ultimately a way may be found whereby doctors, not Fellows of the Academy, may be so certified and thus the public be informed as to fully qualified specialists throughout the city. The details of the proposal will be published in the Bulletin and only a summary is given here.

It is proposed that two classes of membership be created in the Academy to be known as "Members" and "Fellows." A doctor, being elected to membership becomes a "Member," qualifications for Members to remain the same as the present qualifications for "Fellows." Upon election a Member shall be assigned to the Section of his choice. Each Section, through its Advisory Committee, shall set up, with the approval of the Council, qualifications to which a member must conform if he desire to be promoted to Fellowship and designated as Fellow in that particular specialty represented by the Section. For example: Fellow of Internal Medicine, or Fellow in Gynecology, etc. In general the qualifications required shall be similar to

those set up by various national associations and societies in the special fields.

A Fellowship Committee, corresponding to the Committee on Admissions shall be elected from representatives designated to the Nominating Committee by each of the Sections. When a Member of any Section shall have submitted to the Advisory Committee of his Section sufficient evidence that he has met the qualifications approved for Fellowship in that Section, his name shall be submitted to the Fellowship Committee in the same manner as applicants for membership are submitted to the Committee on Admissions. If the Fellowship Committee approve of the recommendation the Member shall be voted upon by the Academy as a candidate for Fellowship of the New York Academy of Medicine in that branch represented by the Section recommending him for Fellowship. Any present Fellow of the Academy will have the privilege of being also designated if he so desire, in the same manner. If approved by the Fellowship Committee and by the Council, he shall become Fellow in the particular specialty, without further action by the Academy as a whole.

By the adoption of the proposed changes the Academy will take a definite step toward real organization in the matter of specialism. And if our programme for continued education eventuate there will be provided the facilities whereby the candidate for specialism may properly receive adequate training under competent supervision.

The Committee on Public Health Relations has continued the same splendid, active course for which it has had a well merited reputation over many years. It is doing splendid work in the study of puerperal mortality, under the direction of Dr. Ransom S. Hooker; in coöperating with the State for improvement of the working of the Workmen's Compensation Act; in carrying to a successful conclusion the establishment of the Blood Donors Betterment Association; and in this connection, the adoption of rules by the Board of Health which will require the medical supervision of all donors. It has set up the National

Committee on Nomenclature to which the Academy acts as host and of which Dr. H. Burton Logie is Executive Officer.

The Press Relations Bureau, with Dr. Iago Galdston at its head, has become a very active and influential organization. Gradually it is building up a relation between the medical profession and the press which is proving to be most helpful in getting proper information on medical subjects before the general public. The value of this work is only beginning to be apparent but the interest shown in it by all concerned is proof of its importance; and the Council believes that the success of this undertaking is worthy of special emphasis. These various activities have been made possible by donations from the Carnegie Foundation, the Commonwealth Fund, the Milbank Fund and the Altman Foundation, for which the Council expresses its sincere thanks.

The Committee on Professional Standards has continued its interesting and very valuable work during the year. It has been my privilege to take part in its deliberations and I am greatly impressed by the broadminded, careful and fair analysis that is made of every problem presented to it. This Committee should, in no sense, be considered as a body of censure. Its only purpose is to have a careful, deliberative group before which may be placed the complex, difficult problems that are constantly arising in the practice of medicine and which, if not given due consideration, may lead to undesirable ends. You have been informed already of the action of this Committee in endeavoring to exert further influence against the practice of fee-splitting. The Council gave very serious study to the recommendation relating to this matter and finally decided to call the attention of every candidate for admission to the Academy to the unethical and immoral aspects of this practice. By such careful educational means it is hoped that, ultimately, progress may be made in stamping it out.

Any young man, desirous of enjoying the privileges of

the Academy will be fully apprised of the impossibility of doing so if he become a party to this practice, and while complete proof of such is difficult to obtain, those who are guilty of it are, as a rule, not unknown to their associates.

Allusion has already been made to the hope which we have for the enlargement of the Library and it is with satisfaction that we report a very steady growth of the Library itself. The accession of books and reprints is constant, many of them through the generous gifts of the Fellows. By means of those not needed for our own stack, we are able to carry on a very extensive exchange library with other institutions, and in many cases have made valuable donations of our triplicate volumes to libraries less fortunately situated. Special donations to the Library amount to \$1090, \$840 of which was expended for the purchase of books, and \$250 was given for the purchase of a portrait of Hippocrates on china by the artist Anker. A complete list of all gifts appears in the appended report.

The Council is glad to report that there has been a very active coöperation on the part of the Sections and the Programme Sub-Committee of the Committee on Medical Education with Dr. Samuel Kopetzky as Chairman. The institution of an Advisory Board to each Section has proved increasingly useful and the Chairmen of the Sections have met on several occasions under the Chairmanship of a Vice-President, Dr. Lewis A. Conner, and have taken a very active part in inaugurating changes of real value. Under these various groups the work of all the Sections is becoming constantly an increasing influence in the education of the practitioners of the city.

The Council now has under consideration a plan whereby the procedures of the various Sections may be published in a yearly volume or in an enlarged Bulletin. This, however, can only be accomplished as a part of our enlarged programme when the funds for this are available.

The Council records its satisfaction in having elected as

benefactors, because of material aid given to the Academy, Mrs. Kate Macy Ladd, Mrs. Marcia Brady Tucker, and Mr. Carll Tucker. Jules Bordet, Russell Henry Chittenden, Madame Marie Curie, Ernst Fuchs, Sir Frederick Gowland Hopkins, René Leriche and Sir Thomas Lewis, upon the recommendation of the Committee on Honors, were elected to Honorary Fellowships. Upon the recommendation of the same Committee, the Academy Medal in gold was awarded to Dr. Carl Koller for his work in inaugurating the use of cocaine as a local anæsthetic.

To summarize, we have had a year of unusual activity in actual accomplishment and in thoughtful and wise planning for the future. In all these there appears an approach to our ultimate goal. This goal is to make of the Academy of Medicine an institution whose influence in the betterment of the practice of medicine shall be wise, forceful, and widely operative.

Rendering aid to every physician in the solving of his advanced educational problems, whether or not he be a Fellow, falls within our province. Making the best that the practice of medicine affords available to every patient is not beyond our hope and this conception is broad enough to include the individually sick and the health of the public.

It is to this task that your Administration again calls you and with full confidence that the call will find enthusiastic response and wise guidance at your hands.

## THOMAS W. SALMON MEMORIAL

A Memorial meeting was held at The New York Academy of Medicine on January 10, 1931, under the auspices of the Thomas William Salmon Memorial, Inc. At this meeting impressive addresses were made by Reverend Harry Emerson Fosdick, Dr. Louis Casamajor, Brigadier General Sanford H. Wadhams and Dr. William L. Russell. Dr. Lewellys F. Barker presided.

Dr. Russell concluded his remarks by announcing that the Thomas W. Salmon Memorial Committee had determined to turn over the Fund of \$100,000 to The New York Academy of Medicine, the income of which was to be used for providing a series of lectures to be given annually and published in book form, and that part of the income might be used for the advancement of psychiatry and mental hygiene in other ways.

The gift was accepted by Dr. John A. Hartwell, President of the Academy, who expressed his deep appreciation of the confidence which the Committee had placed in the Academy. Dr. Hartwell assured the Committee that every effort would be made to carry out the plan indicated by the Committee. The form of agreement which was proposed to the Academy and accepted by the Council was as follows:

1. The fund will be held in trust by the Academy as a memorial to the late Dr. Thomas W. Salmon and will be designated "The Thomas W. Salmon Memorial Fund."
2. The principal will be kept intact and the income applied toward providing a series of lectures to be given and published in book form annually, for the advancement of psychiatry and mental hygiene and to be designated "Thomas W. Salmon Memorial Lectures." Each volume will contain a statement explaining the origin and purpose of the fund. Part of the income of the fund

may, however, be administered for the advancement of psychiatry and mental hygiene in other ways than by means of lectures.

3. Five per cent of the income from the fund may be used by the Academy for overhead administrative purposes. The above, the Committee understands, are the terms on which the fund is accepted by the Academy.

The following are suggestions of the Committee which embody views, wishes and expectations which were formed and found expression during the campaign for funds. They are submitted with the understanding that they are suggestions which may be useful to the Academy but which create no legal obligation:

1. A special committee to determine and carry out the purposes of the Memorial is to be appointed annually by the Council of the Academy with the title "The Thomas W. Salmon Memorial Committee," this Committee, at the outset, to be the present Executive Committee of the Salmon Memorial Committee. Upon their resignation:
2. The Committee to be constituted as follows:
  - a. The President of the Academy; the Director of the Academy, or the Chairman of its Section of Psychiatry if established
  - b. Two professors of psychiatry of leading universities
  - c. A psychiatrist of eminence representing the National Committee for Mental Hygiene
  - d. A fifth member to be nominated by the preceding four, preferably a psychiatrist
3. The lectures are to be given not only at The New York Academy of Medicine but also in other cities under the auspices of an educational or scientific organization. This was set forth in the nation-wide appeal for funds.
4. The lectures should invariably be distinguished as contributions to the advancement of psychiatry, mental hygiene, and related subjects.



5. Funds that may be available after the expenses of the lectures and their publication are defrayed are to be applied to other projects for the advancement of psychiatry and mental hygiene. A Salmon Medal or financial assistance to promote research and notable contributions is suggested.

At a meeting of the Council held in January the President was authorized to appoint a Committee to be known as the Thomas W. Salmon Memorial Committee, in accordance with the suggestions made in the form of agreement.

The following Committee was duly appointed:

Dr. C. C. Burlingame, Chairman

*Dr. Frankwood Williams*

Dr. Stephen P. Duggan

Dr. Haven Emerson

Dr. William L. Russell

At the close of the meeting on January 10, Dr. Burlingame, in behalf of the Academy Committee, announced that Dr. Adolf Meyer, Professor of Psychiatry at Johns Hopkins University, and Director of the Henry Phipps Psychiatric Clinic, would give the first series of lectures in 1931.

## PROPOSED NEW CLASSIFICATION OF MEMBERSHIP IN THE ACADEMY

During the last three years a number of proposals have been discussed by various members of the Council and Standing Committees for providing different classes of members. In all of these proposals there was the suggestion that qualifications for Fellowship should be raised.

This matter was discussed in considerable detail by the Committee on Activities, which noted in its report, approved by the Council in April, 1929, that it had considered the possibility of the organization of another type of membership which might be known as "Junior Fellows," "Section Members," or "Associates," and recommended that the question be given further consideration by the Council.

In the beginning of the year 1930, the Section on Laryngology recommended to the Council that no Fellows of the Academy become members of that Section unless they met the requirements of experience and training laid down by the American Academy of Otolaryngology.

The matter was referred to the Committee on Sections which considered a series of proposals and recommended that the proposals be considered at a meeting of the Section officers and members of the Advisory Committees of the Sections. At the meeting held in January, 1930, these proposals were given careful consideration and there was unanimous approval of a number of them.

Meantime the Committee on Medical Education has been discussing for a period of two years various methods which might be employed for the better training of specialists and considering what requirements might be laid down for determining qualifications for specialism.

The proposals were submitted to the Council at its November meeting and it was voted that they be referred to a Joint Committee consisting of representatives of the

Council and a sub-committee of the Committee on Medical Education which reported to the Council at its meeting on December 17 with definite recommendations. After detailed discussion the proposals were adopted by the Council with a resolution that the By-Laws be amended so that the proposals might be put into effect.

### SUMMARY OF THE PROPOSALS

. That two classes of membership be created in the Academy to be known as "Members" and "Fellows."

That the qualifications for membership be the same as the present qualifications for Fellowship.

That the qualifications for Fellowship be determined by each Section and be applied only to members assigned to that particular Section, the qualifications for Fellowship to be subject to approval of the Council and to be similar to those of the American Board of Ophthalmology, the American Academy of Otolaryngology and other similar medical societies.

That Members who have the qualifications adopted shall be elected to Fellowship and the Member known as a "Fellow in Otolaryngology," "Fellow in Gynecology," etc.

That the privileges and obligations of the present Fellowship be not changed except that voting rights in the Sections will be restricted to one Section; and if a Fellow passes the qualifications adopted by the Sections and Council, he will be permitted to become a Fellow in Otolaryngology, Gynecology, etc.

The details of the proposals are as follows:

### ELECTION TO MEMBERSHIP

1. A candidate for admission to the Academy shall have the present qualifications for Fellowship, and if elected, shall become a member of the Academy and be assigned to such Section as he request.
2. Members of a Section shall have all the present privi-

leges and obligations of Fellowship except that of holding office.

3. A member may change from one Section to another with the approval of the Committee on Sections.

### QUALIFICATIONS FOR FELLOWSHIP

1. The Advisory Committee of each Section shall determine the requirements of experience and training necessary for a member to qualify as a specialist in that particular field subject to the approval of the Council. These requirements may be changed by the same procedure.
2. The qualifications to be adopted by each Section shall be generally in accordance with the requirements for the certification of specialists by certain national medical societies.
3. There shall be a Fellowship Committee consisting of one representative from each Section. On a given date, each Section shall submit to the Nominating Committee the names of three Fellows, Members of the Section. From these three the Nominating Committee shall select one as its nominee for Membership on the Committee of Fellowship. The term of office of the Members of the Committee on Fellowship shall be three years, except that at the first election one-third of them shall be elected for one year; one-third for two years and one-third for three years. Thereafter the election shall be for a three year term.
4. When a member of the Section shall have submitted to the Advisory Committee of the Section sufficient evidence that he has met the qualifications approved for Fellowship in that Section, his name shall be submitted to the Fellowship Committee for consideration with such data as the Fellowship Committee may, from time to time, determine. If the Fellowship Committee approves of the recommendation of the Section that a member become a Fellow it shall recommend to the

Academy the election of said member as a Fellow in that branch of medicine represented by the Section recommending him for Fellowship.

5. The present Fellows of the Academy and newly elected Members shall have voting rights in one Section only. Each Fellow may designate the Section in which he wishes to vote. Members shall vote in that Section to which they requested assignment. Both Fellows and Members shall have freedom of action in changing from one Section to another for the purpose of voting.
6. The present Fellows of the Academy will continue to be known as Fellows but a Fellow of the Academy now a member of a Section may apply to the Advisory Committee of the Section for permission to be known as a Fellow in the specialty represented by that Section and shall submit the evidence that he has fulfilled the requirements of experience and training adopted by that Section and approved by the Council. Such Fellow shall then be recommended to the Fellowship Committee and if it approves, his name shall be recommended to the Council for designation as a Fellow in that specialty.

#### AFFILIATED SOCIETIES AND EXCEPTIONS

1. The above procedure shall not apply to the Section of Historical and Cultural Medicine.
2. It is recognized that it may be essential to provide for Fellowship in Pathology, Roentgenology and Research Medicine. It is possible that this might be arranged with the coöperation of the New York Roentgen Society, the New York Pathological Society, the Society for Experimental Biology and Medicine and the Harvey Society, particularly through the interests of the members of those societies who are now Fellows of the Academy.

## ALLOCATION OF DUES

At a meeting of the Trustees held on January 28, 1931, the following resolution was passed :

RESOLVED, That the sum of \$70,000 to be received in 1931 from dues of Fellows be appropriated for the following purposes :

For operation of the building—

Salaries	28,890	
Expenses	<u>16,900</u>	45,790
Less assessments for building maintenance		<u>16,000</u>
Net		29,790
For maintenance of Sections and Stated Meetings		12,880
For maintenance of Library		24,330
Salaries of bookkeeper & membership clerk (part of)		3,000

## RECENT ACCESSIONS TO THE LIBRARY

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- Allendy, R. F. *Les rêves et leur interprétation psychanalytique.*  
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Paris, Alcan, 1930, 163 p.
- Anderson, G. M. *Orthodontic laboratory manual.*  
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- Benthin, W. *Diagnose und Differentialdiagnose der Frauenkrankheiten.*  
Berlin, Urban, 1930, 365 p.
- Bouveret, L. *Essai sur la pathogénie du cancer.*  
Paris, Baillière, 1930, 153 p.
- Bovard, J. F. and Cozens, F. W. *Tests and measurements in physical education.*  
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- Bundy, E. R. *Text-book of anatomy and physiology for training schools.* 6. éd.  
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- Carton, P. *L'art médical; l'individualisation des règles de santé.*  
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- Cathelin, F. *Conférences cliniques et thérapeutiques de pratique urinaire.* 3. éd.  
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Bristol, Wright, 1930, 173 p.
- Davies, S. P. Social control of the mentally deficient.  
London, Constable, 1930, 389 p.
- De Gruchè, K. Dr. D. Duncan Main of Hangehow who is known  
in China as Dr. Apricot of Heaven Below.  
London, Marshall, [1930], 243 p.
- Elmer, W. P. and Rose, W. D. Physical diagnosis.  
St. Louis, Mosby, 1930, 903 p.
- Evans, A. D. and Howard, L. G. R. The romance of the British  
voluntary hospital movement.  
London, Hutchinson, [1930?], 360 p.
- Fabian, H. Goldgussfüllungen in Bild und Spiegelbild.  
Berlin, Meusser, 1930, 69 p.
- Fischer, E. Anleitung zur Darstellung organischer Präparate.  
11. Aufl.  
Braunschweig, Vieweg, 1930, 107 p.
- Friteau, E. Anatomie et physiologie, histologie, embryologie,  
pathologie, et thérapeutique. Manuel du candidat aux examens  
de chirurgien-dentiste. 4. éd.  
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- Griffin, E. M. The technic of resilient arch assemblage.  
Newark, Alpine Press, [1930], 89 p.
- Gurwitsch, A. Die histologischen Grundlagen der Biologie.  
Jena, Fischer, 1930, 310 p.
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- Holleman, A. F. A text-book of organic chemistry. 7. English ed.  
N. Y., Wiley, 1930, 594 p.
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# PROCEEDINGS OF ACADEMY MEETINGS

## JANUARY

### ANNUAL MEETING

Wednesday Evening, January 7, at 8:30 o'clock  
(Please note change in date)

#### ORDER

- I. EXECUTIVE SESSION
  - Reading of the Minutes
  - Election of Fellows
- II. AWARD OF ACADEMY MEDAL—David Marine
- III. ANNUAL REPORTS
  - The Council, John A. Hartwell
  - The Trustees, Eugene H. Pool
  - The Treasurer, Seth M. Milliken
  - Committees:
    - Admission, Alexis V. Moscheowitz
    - Library, Ernest G. Stillman
    - Public Health Relations, James Alexander Miller
    - Medical Education, Nellis B. Foster
    - Sections, Lewis A. Conner
    - Professional Standards, Samuel W. Lambert
    - Medical Jurisprudence, Israel Strauss

Thursday Evening, January 15, at 8:30 o'clock

#### THE FOURTH HARVEY LECTURE "PSYCHOANALYSIS AND MEDICINE"

FRANZ ALEXANDER  
Professor of Psychoanalysis  
University of Chicago

ALFRED E. COHN, President Harvey Society  
DAYTON J. EDWARDS, Secretary Harvey Society

This lecture takes the place of the second Stated Meeting of the Academy for January.

#### SECTION OF SURGERY

Friday Evening, January 2, at 8:30 o'clock

#### ORDER

- I. READING OF THE MINUTES
- II. PRESENTATION OF CASES
  - a. Cases of thrombo-angiitis obliterans with massive gangrene healed by conservative methods, Saul S. Samuels
  - b. 1. Tuberculosis of ulnar bursa. Radical operation. Result one year

2. Acute edema of the pancreas
3. Actinomyces of the transverse mesocolon. Radical resection.  
Result fifteen months, John H. Garlock

- c. 1. Resection of descending colon for embolus of the left colic artery
2. Hemangio-endothelioma of the stomach treated by excision, John H. Morris

- d. Cases illustrating the paper of the evening, Percy Klingenstein

### III. PAPER OF THE EVENING

Asymptomatic common duct stones, Percy Klingenstein

### IV. GENERAL DISCUSSION

#### SECTION OF DERMATOLOGY AND SYPHILIOLOGY

Tuesday Evening, January 6, at 8:30 o'clock

##### ORDER

- I. READING OF THE MINUTES
- II. PRESENTATION OF CASES
  - a. Cases from Good Samaritan Dispensary
  - b. Miscellaneous cases

### III. GENERAL DISCUSSION

### IV. EXECUTIVE SESSION

Examination of cases is limited to members and their invited guests.

#### SECTION OF HISTORICAL AND CULTURAL MEDICINE

*Joint meeting with the*

#### SECTION OF PEDIATRICS

Thursday Evening, January 8, at 8:30 o'clock

##### ORDER

- I. READING OF THE MINUTES
- II. PAPERS OF THE EVENING
  - a. Thomas Phaer: Boke of Children, 1541, Howard Reid Craig
  - b. History of Diphtheria in New York City, William H. Park
  - c. Development of Pediatrics in New York City, Linnaeus E. La Petra
- III. GENERAL DISCUSSION
- IV. EXECUTIVE SESSION

#### SECTION OF OTOTOLOGY

Friday Evening, January 9, at 8:30 o'clock

##### ORDER

- I. READING OF THE MINUTES
- II. REPORT OF TWO CASES, Clarence H. Smith
- III. PAPERS OF THE EVENING
 

Symposium on petrositis

  - a. Anatomy and pathology, J. G. Druss (by invitation)
  - b. The clinical entity, Samuel J. Kopetzky
  - c. Surgical therapy, Ralph Almour

Discussion: Isidore Friesner, Wells P. Eagleton
- IV. GENERAL DISCUSSION
- V. EXECUTIVE SESSION

SECTION OF NEUROLOGY AND PSYCHIATRY  
*Joint meeting with the*  
NEW YORK NEUROLOGICAL SOCIETY  
Tuesday Evening, January 13, at 8:30 o'clock  
ORDER

- I. READING OF THE MINUTES
- II. CLINICAL PRESENTATIONS  
From the Neurologic Service of Bellevue Hospital  
(The presentation of each case or group of cases is limited to five minutes)
  - a. 1. Dystonia musculorum deformans  
2. Gas poisoning with dystonic fragment, Foster Kennedy
  - b. Case of Kummel's spondylitis, E. D. Friedman
  - c. Pellagra with neurological manifestations, Thomas K. Davis
  - d. 1. Dystonic dysgraphia  
2. Torticollis and the tonic neck reflexes, Samuel Brock
  - e. Brain tumor with sudden death, Lewis D. Stevenson
  - f. A tumor of the posterior corpus callosum, George H. Hyslop
  - g. Neurosurgical presentation, Byron P. Stookey
- III. PAPERS OF THE EVENING
  - a. Sensory conduction in the peripheral nervous system, S. W. Ranson, Northwestern University (by invitation)
  - b. The anatomical basis of sympathectomy as a therapeutic measure in certain diseases, Albert Kuntz, St. Louis University (by invitation)Discussion: Karl M. Dallenbach (by invitation), Charles A. Elsberg, Byron P. Stookey, Albert Kuntz
- IV. GENERAL DISCUSSION
- V. EXECUTIVE SESSION

SECTION OF ORTHOPEDIC SURGERY  
Friday Evening, January 16, at 8:30 o'clock  
ORDER

- I. READING OF THE MINUTES
- II. PAPERS OF THE EVENING
  - a. Osteitis fibrosa and giant cell tumor, Charles F. Geschickter, M. M. Copeland (by invitation)
  - b. Clinical and experimental hyperparathyroidism (osteitis fibrosa cystica) and its relation to other bone dystrophies, Henry L. Jaffe (by invitation)
- III. GENERAL DISCUSSION  
Opened by Arthur Purdy Stout

SECTION OF OPHTHALMOLOGY  
Monday Evening, January 19, at 8:30 o'clock  
ORDER

- I. READING OF THE MINUTES
- II. PRESENTATION OF CASES

- a. Medullated nerve fibres associated with choroiditis, Milton L. Berliner
- b. Apparent cure of serous detachment following Gonin operation, Julius Wolff
- c. Melanoma of the conjunctiva
- d. Total ectasia of the sclera, James W. Smith
- III. PAPER OF THE EVENING  
Microscopic and photographic demonstration of tissue formations on the optic nerve-head, Arthur J. Bedell, Albany (by invitation), Bernard Samuels
- IV. GENERAL DISCUSSION
- V. EXECUTIVE SESSION

SECTION OF MEDICINE

Tuesday Evening, January 20, at 8:30 o'clock  
ORDER

- I. PAPERS OF THE EVENING
  - a. Serum therapy in meningococcus meningitis, Augustus B. Wadsworth, Albany
  - b. Meningococcus meningitis in Detroit, 1928 to 1931, John E. Gordon, Detroit (by invitation)
  - c. Twenty-five years of serum treatment of epidemic meningitis, Simon Flexner
- II. DISCUSSION: Lewis Fisher, Josephine B. Neal, William W. Herrick

SECTION OF GENITO-URINARY SURGERY

Wednesday Evening, January 21, at 8:30 o'clock  
ORDER

- I. READING OF THE MINUTES
- II. PRESENTATION OF CASES  
Two unusual cases of perinephritic abscess, John A. Taylor (by invitation)
- III. PAPER OF THE EVENING  
Postoperative care of urological cases, Henry G. Bugbee  
Discussion: Benjamin S. Barringer, Edwin Beer, F. Warner Bishop, Nathaniel P. Rathbun
- IV. GENERAL DISCUSSION, Oswald Lowsley, Stanley Woodruff, Sturdivant Read
- V. EXECUTIVE SESSION

SECTION OF OBSTETRICS AND GYNECOLOGY

Tuesday Evening, January 27, at 8:30 o'clock  
ORDER

- I. READING OF THE MINUTES
- II. PRESENTATION OF NEW INSTRUMENTS AND CASES
  - a. An ocular attachment to the cystoscope for teaching purposes, Isador W. Kahn
  - b. Salpingograms, illustrating their diagnostic value, Martimer N. Hyams

- c. A case of tuberculosis of the clitoris, Gerard L. Moench
- III. PAPERS OF THE EVENING
  - a. The operative correction of retrodisplacements of the uterus, Walter T. Dannreuther
  - b. The standardization of coagulation-diathermy of the uterus (illustrated by motion pictures), Thomas H. Cherry
- IV. GENERAL DISCUSSION
- V. EXECUTIVE SESSION

SECTION OF LARYNGOLOGY AND RHINOLOGY  
Wednesday Evening, January 28, at 8:30 o'clock

ORDER

- I. READING OF THE MINUTES
- II. PRESENTATION OF CASES
  - a. Venous aneurysm of face, A. J. Conty (by invitation)
  - b. Osteoma involving orbit, ethmoids, frontal and sphenoid—operation, Robert E. Buckley
  - c. Extrinsic carcinoma of larynx—operation, Robert E. Buckley
- III. PAPER OF THE EVENING
 

The relation of the epithelium to the mucosa in pachydermia laryngis (lantern slides and wax model), Louise H. Meeker (by invitation)

Discussion opened by A. A. Eggston
- IV. ROUND TABLE CONFERENCE
 

Subject: "Present status of sinusitis in eye disorders"

  - a. Abstract of recent literature, C. J. Imperatori
  - b. Ophthalmological aspect, Edgar S. Thomson
  - c. Rhinological aspect, Duncan Macpherson
- V. GENERAL DISCUSSION
- VI. EXECUTIVE SESSION

NEW YORK ROENTGEN SOCIETY  
In Affiliation With  
THE NEW YORK ACADEMY OF MEDICINE  
Monday Evening, January 19

ORDER

- I. 8:30 P. M.
 

In memoriam: Webster W. Belden, John Remer
  - II. 8:40 P. M.
 

Demonstration of interesting cases and roentgenograms \*
  - III. 9:00 P. M.—Papers of the Evening
 

Some problems in the diagnosis and treatment of lymphoblastoma, George W. Holmes, Boston (by invitation)

Radiotherapy in lymphoma, K. R. McAlpin
  - IV. GENERAL DISCUSSION
 

To be opened by Nathan Rosenthal, John Remer
  - V. EXECUTIVE SESSION
- ROSS GOLDEN, President
- J. BENNETT EDWARDS, Secretary

New York Meeting  
of the  
SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE  
Under the Auspices of  
THE NEW YORK ACADEMY OF MEDICINE  
Wednesday, January 21, 1931, at 8:15 o'clock

- I. Bacteriological investigations on blood, synovial fluid and subcutaneous nodules in rheumatoid arthritis, M. H. Dawson, M. Ohmstead and R. H. Boots
  - II. Agglutination reactions with hemolytic streptococci in rheumatoid arthritis, M. H. Dawson, M. Ohmstead and R. H. Boots
  - III. Role of certain anaerobic toxins in pneumococcus infection, A. B. Sabin (Introduced by W. H. Park)
  - IV. Various carbohydrates on production of diphtheria toxin with special reference to its flocculating power, E. L. Hazen and G. Heller (Introduced by E. P. Gay)
  - V. Passive local sensitization in atopic individuals, M. Walker and K. Bowman (Introduced by M. J. Shear)
  - VI. Blood sugar response to intravenous insulin in normal and diabetics, W. S. Collens and H. G. Grayzel
  - VII. Injections of cortin on resistance of suprarenalctomized rats. Biological assay of extracts of suprarenal cortex, D. Perla and J. Marmorston-Gottesman
  - VIII. A hormone preparation from the kidney which is an antagonist of adrenalin and pituitrin, R. I. Wagner and B. Jablons (Introduced by I. S. Kleiner)
  - IX. Pharmacology of learning. The learning-forgetting-remembering process, M. G. Mulinos and C. C. Lieb
- Pexton Rous, President  
A. J. Goldmann, Secretary

THE NEW YORK PATHOLOGICAL SOCIETY  
In Affiliation With  
THE NEW YORK ACADEMY OF MEDICINE  
Thursday Evening, January 22, at 8:30 o'clock

ORDER

- I. DEMONSTRATION OF SPECIMENS
  - a. Lymphosarcoma of the cecum
  - b. Malignant nephrosclerosis, two cases
  - c. Bacterial endocarditis in a heart with congenital incomplete ventricular septum, Joseph S. Grewal (by invitation), Ward J. MacNeal
- II. PAPERS OF THE EVENING
  - a. The relation of mucous glands to the tonsils, Louise R. Meeker
  - b. Actinomyces of the hand with cultures, Adele E. Shepler (by invitation), Joseph S. Grewal (by invitation)



- c. Serological reactions in a case of tuberculosis of the serous membranes, Adelaide B. Baylis (by invitation)
- d. The influence of pus and of blood upon the action of bacteriophage, Martha Applebaum (by invitation), Ward J. MacNeal
- e. Effect of weather variations upon the symptoms of hay-fever patients, Marjorie Hopkins (by invitation)

### III. EXECUTIVE SESSION

LEILA CHARLTON KNOX, President, St. Luke's Hospital

BERYL H. PAIGE, Secretary, The Babies' Hospital

## FELLOWS ELECTED FEBRUARY 5, 1931

Helen Gavin.....	147 East 50th Street
Robert S. Grinnell .....	910 Park Avenue
John Taylor Howell, Jr. ....	815 Park Avenue
Robert L. McKiernan .....	Medical Tower, Newark, N. J.
Girard F. Oberrender .....	120 East 75th Street
Nathan O. Ratnoff .....	1192 Park Avenue
Paul M. Wood .....	2511 Sedgewick Avenue

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## DEATHS OF FELLOWS OF THE ACADEMY

ROY BLOSSER, M.D., 224 Thayer Street, Providence, R. I.; graduated in medicine from Jefferson Medical College, Philadelphia, Pa., in 1906, elected a Fellow of the Academy March 6, 1921; died, January 14, 1931.

HENRY DANIEL BURNHAM, M.D., 105 West 76 Street, New York City; graduated in medicine from New York University Medical College, New York City, in 1889; elected a Fellow of the Academy February 1, 1906; died, February 3, 1931. Dr. Burnham was a Fellow of the American Medical Association, and a member of the County and State Medical Societies.

JOHN WILLIAM DRAPER, M.D., 285 Madison Avenue, New York City; graduated in medicine from New York University Medical College, in 1898; elected a Fellow of the Academy November 3, 1904; died, January 26, 1931. Dr. Draper was a Fellow of the American Medical Association, a Fellow of the American College of Surgeons, a member of the County and State Medical Societies and a member of the American Gastro-Enterological Society.

FRANK HARTMANN FIELD, M.D., 123 William Street, New York City; graduated in medicine from the Detroit College of Medicine, Detroit, Michigan, in 1893; elected a Fellow of the Academy March 1, 1906; died, June 8, 1930.

THOMAS FRANCIS REILLY, M.D., 43 West 88 Street, New York City; graduated in medicine from Bellevue Hospital Medical College, New York City, in 1896; elected a Fellow of the Academy May 7, 1914; died, January 24, 1931. Dr. Reilly was a Fellow of the American College of Physicians, a member of the American Association for Therapeutic Surgery, a member of the Alumni Association of City Hospital, and Physician to Fordham and St. Vincent's Hospitals.

LEO HIRSHON SHERMAN, M. D., 441 13 Street, West New York, New Jersey; graduated in medicine from Buffalo University Medical College, in 1896; elected a Fellow of the Academy April 1, 1909; died, February 2, 1931.

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# BULLETIN OF THE NEW YORK ACADEMY OF MEDICINE

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VOL. VII

MARCH, 1931

No. 3

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## ANNUAL GRADUATE FORTNIGHT

### APPENDICITIS

EUGENE H. POOL

Attending Surgeon, New York Hospital

It is beyond question, I think, that the appendix has caused more suffering, sickness and death than any other single structure of the human body. Yet it is so small and apparently so insignificant that its importance was not recognized until relatively recent years.

When the appendix is acutely infected its peculiar blood supply favors necrotic areas through its thin wall. Its floating and unprotected position in the peritoneal cavity favors spread of infection through that great area. Its generous circulation leads to early and intense reaction of the system to absorbed toxic products. Its structure embodies two tissues which elsewhere are frequently subject to chronic inflammation, namely, mucous membrane and lymphoid tissue; yet careful analysis, both gross and microscopic reveals nothing in either of these that might be interpreted as the source of a persistent chronic infection, such as is noted in connection with the teeth, tonsils, seminal vesicles or gall bladder. Whereas the appendix is a part of the intestinal tract, it does not participate in the digestive processes; in fact, in man it has no functional activity.

Our motive is a clinical not an academic consideration of

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\*Delivered October 23, 1930.

appendicitis. We are called to the bedside of a prostrated patient or asked to pass on a patient who walks into our office. In accordance with this objective, only three broad subdivisions need be discussed—chronic, acute and recurrent.

The usual conception of appendicitis is that inflammation of the organ is due to one of two causes, first, interference with the blood supply which may occur from pressure of a foreign body, as a fecal concretion, or distention from blockage of the lumen; second, a lesion of the mucous membrane which allows microorganisms to penetrate and proliferate. It is pictured by one author that if such factors are severe and sudden the acute type results—if they are mild but continuous or recurrent the chronic form occurs. This conception of the acute may be accepted. It is likewise true of the recurrent, which consists in intermittent attacks of variable intensity. It is immaterial how slight the clinical manifestations may be, there is nevertheless an acute reaction or inflammation as the underlying basis of each attack. Although recurrent appendicitis is usually classed as chronic, it is more properly a subdivision of acute.

The term appendicitis indicates inflammation. But we rarely, if ever, see an appendix which suggests an active chronic inflammatory process. At times, the organ is adherent to or incorporated in the wall of the cæcum. At times it shows sclerosis, scars, or a lumen partially obliterated, even with a definite stricture. Such conditions indicate an antecedent inflammatory process. But usually the organ is freely movable, not congested until traumatized and only shows a bend or kink which seems to excuse its removal. In other words, most of the chronic appendices show no gross evidence of active inflammation, though a certain proportion present signs of an inflammatory reaction at some previous time.

Symmers has made a careful microscopic study of several thousand appendices removed at operation. He reports definite changes in about 10 per cent, which is a very low percentage. We will summarize his findings:

The serosa pale and smooth; on section lumen diminished in size or occluded, mucous membrane thickened and swollen (pale), and in it pin point cream colored bodies which proved on microscopic examination to represent lymphoid follicles. In some, especially older patients, the appendix reduced to a pale cordlike structure, with a few atrophic lymphoid follicles and almost complete connective tissue replacement of the mucosa and obliteration of the lumen.

He assumes that the lymphoid changes are part of a general lymphoid peculiarity of a status type and the sclerotic secondary to this. Whereas this lesion which represents lymphoid hyperplasia is usually classed as chronic inflammatory, it is reasonable to assume that it is simply a local manifestation of a general peculiarity of the lymphoid tissues which occurs in some individuals. Under such an assumption this group is eliminated from chronic appendicitis.

We have shown that chronic appendicitis, strictly speaking, rarely, if ever, occurs—yet the public and even some of the profession have a loose and distorted idea of the term and of the indications for and results of removal of the organ.

We have tried to analyze the reasons which lead to the removal of so many “chronic appendices.” They may be classified as follows:

Prophylaxis, i.e., to eliminate the danger of an acute attack.

Phobia, i.e., fear of an acute attack.

Dysfunction.

Discomfort.

Let us examine and criticize these:

On the basis of a few indefinite symptoms, as discomfort and vague digestive disturbances, the clinician is prone to visualize an appendix which is chronically inflamed. The patient is said to be suffering from chronic appendicitis and appendectomy is performed. Pain or discomfort, the most frequent of the symptoms, are often caused by gas in

the cæcum, resulting perhaps from a spastic colon; the patient is usually suffering from a phobia or fear of appendicitis. The appendix often is not diseased and the real value of the operation is the prevention of an acute attack and laying at rest the fear of such a development. "Chronic appendicitis" has become a friendly term by which functional derangements of the intestinal tract may be explained. Whereas, such symptoms as chronic constipation, colicky pains along the course of the large bowel, intermittent attacks of diarrhœa are usually purely functional derangements, they excite efforts to explain them by some definite lesion of an inflammatory, neoplastic or mechanical nature which can be corrected by surgical measures. In so far as this attitude leads to thorough study of the case, it cannot be too highly commended. But, unfortunately, chronic constipation and pains in the right iliac fossa often lead to unnecessary operations, such as removal of a so-called chronic appendix, repair of an incompetent iliocæcal valve, plication of a redundant or distended cæcum, freeing of kinks or bands, side tracking, as ileosigmoidostomy, and even resection of the colon. The symptoms usually persist after such procedures which are in general ill advised efforts to correct chronic constipation and its associated disturbances by the short cut of surgery.

*Indications*—When there is strong evidence of a single recent acute or subacute attack, or repeated suspicious attacks, it is wise to remove the organ. It is fair to assume that an acute attack threatens. Its prevention is definitely indicated. This is especially important when the habits or work of the patient separates him from surgical contacts. But such cases must be classed as recurrent appendicitis, not as chronic. It must be emphasized that operation should not be delayed when there is definite evidence of an acute inflammation even if this is apparently slight.

The appendix is a menace, especially in the young; with advancing years statistics show that the incidence of appendicitis drops rapidly and progressively. In the young, one is justified in taking a somewhat radical attitude.

It is difficult, indeed impossible, to understand how such an organ, in the absence of a real lesion, can exert an influence upon the general health of the patient, upon remote organs as the pylorus or upon the functional activity of the intestine.

On the other hand, as Alvarez and others have shown, irritation of the cæcum as the result of disease of the appendix, which may be due to inflammation or mechanical causes as stone or stricture, may produce all grades of back pressure from a slight iliac stasis to the vomiting of large amounts of intestinal fluid. The degree depends upon the intensity of the irritation. In the interval between attacks there are no symptoms; in a subacute attack there may be loss of appetite, nausea and some gastric or duodenal stasis and in an acute attack there may be persistent vomiting. It is thus evident that recurrent acute or subacute attacks of gastro-intestinal disturbances may often be cured by removal of the appendix. Yet considerable caution must be exercised when the temptation arises to remove a so-called chronic appendix to cure chronic gastro-intestinal disturbances. The appendix should be deemed responsible only after careful exclusion of other possible factors; and then it should be pictured not as a chronic inflammation but as some mechanical disturbance and probably dependent upon previous inflammation.

Pain in the right iliac fossa may be due to many factors, only one being the appendix. Either inflammation or obstruction of its lumen may be the cause. Persistent pain or discomfort in this region is probably not due to a chronically inflamed appendix, since such a lesion rarely, if ever, exists. One may properly visualize a localized discomfort as the result of increased peristaltic action (colic) due perhaps to inspissated fecal contents. Occasionally operation reveals such a condition and the patient is relieved by appendectomy. But this is unusual and removal of the appendix is likely to be disappointing in relieving persistent localized discomfort or pain.



Symmers concludes that there is a clinically recognizable syndrome referable to lymphoid hyperplasia of the appendix, marked by repeated attacks of appendical colic, occurring at intervals of days, weeks, or months, and is encountered most frequently in children or young adults, probably peculiar to subjects of status lymphaticus. In such cases the clinical indications for operation are not imperative, and the histology of the appendix shows that the changes do not tend in the direction of perforation but towards fibrosis.

In the course of laparotomy, the appendix should ordinarily be removed if there are no contraindications. This step adds little in time or risk. It removes a useless and potentially dangerous organ and often avoids a second operation, for the reason that not infrequently, especially after pelvic operations, adhesions cause pain in the right lower abdomen. If the appendix has not been removed there is doubt as to whether it is the cause, and in consequence, the patient may be subjected to another operation.

Our discussion of chronic appendicitis is not a quibble as to phraseology. It is, therefore, well to recognize that the lesion, Chronic Appendicitis, strictly speaking, does not exist. Symptoms are due either to recurrent acute attacks or to mechanical disturbances usually resulting from acute attacks. By reason of failure to grasp this many unnecessary operations are performed; too much in the way of symptoms is attributed to the organ; and too much is expected from its removal.

*Diagnosis.* Before even the relatively innocuous operation of appendectomy is undertaken a careful study should be made lest some lesion—the real cause of the symptoms—be overlooked and discovered later. This is not of infrequent record. Moreover, it must be remembered that the cæcum and appendix occasionally are not situated in the right iliac fossa. The cause of such an abnormal situation may be complete transposition of viscera, non-rotation, or non-descent of the cæcum or long meso-cæcum. The possibility must be borne in mind. It is wise, therefore, in the cases, especially in children, to determine the position of the cæcum and appendix by roentgenogram before operation is undertaken. While infrequent, it is an emergency is justifiable.

barrassing operative experience to find the cæcum and appendix in the left iliac fossa after a prolonged and agitated search for them in the usual situation.

X-ray studies give little, if any, information as to whether an appendix should be removed. Such questions as failure to accept barium, retention of barium, segmentation, fixation, etc., are often emphasized but are of no real value.

Assuming that this paper will reach the practitioner rather than the surgeon we will omit technical details such as type and position of incision, extent of exploration and post-operative complications.

The important feature is differential diagnosis. Although this cannot be exhaustively covered, we can touch upon some of the most significant features and some which are not generally appreciated.

Frequently an appendix is removed when the trouble is entirely dependent upon a pelvic lesion, ureteral stone or stricture, disease of the gall bladder or duodenal ulcer. Proper consideration and study of the case should avoid such an error. One feature\* is of diagnostic value in ureteral colic; ordinarily there is cremaster spasm which is usually associated with the other phenomena of the so-called "subinguinal syndrome" as hyperæsthesia limited to the ureteral skin triangle of the thigh.

Occasionally tuberculous peritonitis, spinal cord lesions, and neuroma of the 12th nerve are mistaken for chronic appendicitis. No rules can be laid down for the diagnosis of these.

Very frequently operation is performed when no lesion exists; this is peculiarly true in young Jewesses. We have found in the follow-up records of the Second Surgical Division of the New York Hospital for ten years (1916-1926) that the cases operated upon for chronic and recurrent appendicitis (unfortunately no differentiation was

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\*Supplement: *A. J. S.*, n.s. VIII, No. 2, p. 490.

made between these) showed a symptomatic failure is approximately 12 per cent. In analyzing these failures 125 cases were studied. The poor results were largely in young Jewesses; girls who were working in sweatshops, whose homes were poor, whose food was made up largely of sweets and sodas, whose exercise was practically nil, whose bowel habits were irregular, and whose occupation predisposed to pain on the right side, since many of these girls were operators and used the right foot in working the machines. These patients complained of indefinite pain in the right lower quadrant. After appendectomy they were free from pain for a short time and then it recurred. In the study of the post-operative failures, careful histories and exhaustive physical examinations were made. It was found that by diet, regulation of the bowels, creation of better habits, and improved hygienic conditions, much could be accomplished. Accordingly this type of patient with all the symptoms and signs suggestive of a chronic appendicitis, is now referred to the medical clinic and social service department, and operations have been much less frequent.

One of the most serious mistakes is in overlooking a real lesion of the cæcum, as tuberculosis, actinomycosis or carcinoma. Localized tuberculosis of the colon is of more frequent incidence than is usually supposed. Far too often it goes unrecognized. The most frequent sites are the cæcum and ascending colon. While several types of lesions occur, the most significant for the surgeon is the hyperplastic. This is a slow chronic development with marked thickening of the intestinal wall and relatively little ulceration. Symptoms develop when the lumen or the peristalsis of the bowel are affected. They are abdominal discomfort or colic in right lower quadrant, tenderness, diarrhoea or constipation. Constitutional symptoms and the presence of tuberculous foci elsewhere are suggestive.

Tuberculous mesenteric lymph nodes in children cause pain, tenderness and spasm which suggest appendicitis. X-ray often helps the diagnosis in showing calcium deposits.

Actinomycosis, a microörganism of the fungus variety, occasionally penetrates from the intestinal tract. The ileo-cæcal region is the usual site. A slow progressive inflammatory reaction causes marked thickening of the intestinal wall. In the early stages the lesion may readily be mistaken for carcinoma, hyperplastic tuberculosis, or chronic inflammation dependent upon the appendix.

The colon is a frequent site of cancer. The neoplasm ordinarily is limited in extent, slow in growth and late in metastasizing. Cases are often not recognized until a mass is palpated or signs of intestinal obstruction are present. Yet there are usually suggestive clinical features which should lead to investigation, correct diagnosis and relatively early surgery. These are blood in the stools, abdominal discomfort and derangement of the bowels.

The diagnosis of carcinoma of the colon as well as the two lesions previously cited can be made readily by roentgenogram following a barium meal or enema.

It is important that the possibility of cancer be considered in all cases presenting indefinite abdominal symptoms so that early studies may be made. The trouble is that we are too prone to jump at some other diagnosis and not weigh all the possibilities.

We have had three cases—one in the cæcum, one in the ascending and one in the transverse colon—in which cancer was not suspected before operation, the diagnosis being respectively, duodenal ulcer, cholelithiasis and chronic appendicitis. In all of these roentgenogram of the lower bowel should have resulted in a correct diagnosis.

To summarize:

Chronic appendicitis, as generally employed, is a misnomer. It rarely if ever occurs. The appendix is not the source of a chronic focal infection, it rarely is responsible for chronic symptoms referable to the gastro-intestinal tract. When there is evidence of a single recent acute or subacute attack or repeated suspicious attacks the organ

should be removed. Under other conditions one should be extremely cautious as to diagnosis and in general follow conservative measures before considering appendectomy for disturbances of the gastro-intestinal tract or discomfort in the right iliac fossa.

The pathologist is at a loss to describe the innumerable non-acute appendices which are referred to his laboratory. He cannot report them normal without causing ill feeling; he is practically forced to report "chronic inflammation." Yet there is no such lesion.

It is suggested that the pathological reports be somewhat as follows:

1. Evidence of recent inflammation.
2. Evidence of previous inflammation (scarring, stricture, obliteration, etc.).
3. Evidence of lymphoid hyperplasia.

After this somewhat negative presentation of chronic appendicitis we approach the acute with firmness and conviction.

Here is an acutely sick patient; here is a definite lesion; here is serious danger to life if the diagnosis is not promptly made with timely surgical intervention.

The only question then is whether the patient has appendicitis. If so, immediate operation is imperative. We will not even refer to the Ochsner treatment of delay which is of very limited applicability. It is likewise unnecessary to enter into the diagnostic details of a typical case. But some cases are enveloped in uncertainty and these are worthy of consideration. Our enumeration of the possibilities of diagnostic errors must not be attributed to erudition but to woeful accumulation of bitter experience. Nice judgment is often necessary and this, rather than technical ability constitutes the difference between the real surgeon and the artisan or mechanic.

Probably the most frequent and serious mistakes occur in children in whom the lesion is often far more advanced than the symptoms and signs suggest. Moreover, in infants and children early pneumonia is often diagnosed as acute appendicitis. In this connection we will quote from an article by Adams and Berger (*J. A. M. A.* v. 79, 1922).

“Diagnosis is often very difficult as is evidenced by the fact that of 145 cases of pneumonia over 17% were sent to the hospital as acute appendicitis. As histories are obtained usually with considerable difficulty, reliance must be placed mainly on physical signs and laboratory tests. Previous cold, cough or pain in chest are suggestive. Abdominal pain is difficult to evaluate. In pneumonia abdominal pain is in upper abdomen as a rule. However, there are two main differences: (1) In pneumonia, pain is more severe and persists. (2) In appendix, it is less severe and intermittent. Vomiting is very common in pneumonia. Therefore, pain and vomiting are of little help in differentiation. Headache, irritability and delirium are never present in appendicitis. More reliance is to be placed on the appearance than on anything else. Pneumonia cases are very sick, are irritable and fussy. Respirations are short, rapid, shallow and usually accompanied by expiratory grunt. The face is flushed. In pneumonia the temperature is usually above 102, in appendicitis usually below 102. There may be no lung signs. A slight change in percussion note (especially high in axilla) or in quality or in density of breath sounds are early signs of great significance. In this series 39% had no lung signs when admitted. All pneumonia cases had abdominal tenderness. But in pneumonia, tenderness is more superficial, more a hyperæsthesia and is usually in upper abdomen. In appendicitis, tenderness is deeper and more localized. Rectal examination with tenderness is strongly suggestive of appendicitis. Leucocytosis of 20,000, pneumonia more likely; below 20,000 appendicitis more likely.”

Influenza often presents at its onset exclusively abdominal signs and symptoms—termed intestinal gripe—and

not infrequently this leads to the diagnosis of appendicitis, especially in children. Anæsthesia and operation under such conditions greatly add to the danger and discomfort, especially if pneumonia develops. But the pain and tenderness are not sharply localized and this together with leukopenia should cause suspicion of the true condition and excite caution.

Another confusing lesion in children is a type of erythema with visceral manifestations consisting in abdominal pain and tenderness with fever, but hæmaturia or eruption or both should suggest the true condition.

Just as in the erythemas so in the purpuras (Henoch's purpura) visceral lesions and manifestations may occur. Pain, tenderness, vomiting, etc., often lead to the diagnosis of appendicitis. Careful study will usually elicit some feature to lead to a correct diagnosis, for instance preceding joint pains for which antirheumatic drugs have been taken, and frequently purpuric spots may be found on the limbs.

Salpingitis is often difficult to differentiate and yet this is important since conservative treatment is here indicated.

Acute pancreatitis is sudden with marked prostration and a peculiar cyanosis.

Perforated ulcer usually gives some suggestive history, moreover the sudden onset as if the patient had been shot, with rigid scaphoid abdomen make a picture which can scarcely be mistaken in the early phase.

Undulant fever, due to the B. of Bang, has in some instances been mistaken for appendicitis and operation performed. Simpson and Fraizer (*J. A. M. A.* December 21, 1929, p. 1958) report three cases. Abdominal pain occurred in 11 of their 63 cases noted in or around Dayton, Ohio. Epigastrium in 4; right upper quadrant 4. In 3 cases sudden pain in right lower quadrant with fever, appendectomy was performed. I have seen a similar case. In all of these the correct diagnosis was made after operation by

agglutination test or blood cultures. In the case which I had the privilege of seeing, a young man of 21 complained of abdominal pain for about five months, located in lower right quadrant and for two months tenderness in lower right quadrant. Nausea after meals. Small frequent stools, chills for 3 months, loss of 12 pounds; 3 years previously he had chills, fever and prostration and was treated for malaria. The history should, in this case, have suggested the true diagnosis and appropriate tests should have been made before operation.

Diverticulitis of the colon has in recent years come to occupy an important place in abdominal surgery. The significant features are:

(1) Diverticulitis is a disease of adult life.

(2) The symptoms are similar to those of acute or sub-acute appendicitis, but the lesion being usually in the sigmoid, the symptoms are referred to the lower left quadrant, and are therefore like a left-sided appendicitis.

(3) The inflammatory process almost invariably becomes walled off and leads to abscess and not to diffuse peritonitis.

Among other lesions which may excite uncertainty are acute cholecystitis, ulcerative colitis, pyelitis, intussusception, ectopic gestation, pneumococcus and tuberculous peritonitis.

This summary gives but an imperfect impression of the innumerable lesions which may be mistaken for acute appendicitis or vice versa; as a matter of fact almost every acute lesion within the abdomen has at some time been responsible for such confusion.

We have thus reviewed in a very sketchy fashion some of the pitfalls which the clinician may encounter. The surgeon is faced with the final responsibility. In the event of an uncertain diagnosis he must decide whether the case demands immediate exploration or warrants further observation to arrive at an accurate diagnosis. He must plan



the exposure on the one hand for the case with definite diagnosis; on the other for the case which may demand more or less extensive exploration. He must weigh the contra-indications to operation; select the appropriate anæsthetic and then proceed expeditiously and coolly. The methods of handling an acute case are not standardized, yet statistics from large clinics are very similar. Our figures from the Second Surgical Division of the New York Hospital may be of interest:

From 1915 to 1930—1854 cases of acute appendicitis with 94 deaths, a mortality of 5.06 per cent. Among the causes of death were: peritonitis 51, embolism 2, pneumonia 2, pyelephlebitis 1, sepsis 4. Over half of these deaths were due to peritonitis. It is fair to assume that almost all of these patients could have been saved by more timely diagnosis and operation.

Two series of cases were studied and recorded by my associates, Bancroft and Garlock:

1915-1921—584 Cases	1921-1928—755 cases
15 fecal fistulæ	12 fecal fistulæ
295 drained cases with	(3 required closure operatively)
45 herniæ—15%	264 drained cases with
205 sutured without drains	18 herniæ—5.4%
4 herniæ—1.9%	(no sutures in fascia or skin)
	236 sutured without drains—
	no herniæ

We cannot here enter into operative details. But it is well to emphasize that in recent years where drains have been employed in acute appendicitis cases, sutures in general have not been introduced except in the peritoneum—such open wounds granulate rapidly and as is shown by the statistics, post-operative herniæ are much fewer by reason of the fact that sloughing of the fascia does not occur.

# BACTERIEMIA\*

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At the outset of a discussion on disseminated infection in which bacteria have been found in the blood stream, it is well to suggest limitations and to agree upon definitions; for the study of the spread of bacteria may be profitably discussed from many different points of view, and many of the terms used are applied with unlike meanings.

We shall not refer to the technique of the examination of the blood for bacteria.

The review of the clinical pictures presented in the dissemination of the different species of microorganisms will not be considered, nor the transient bacteremia such as occurs after operation, or manipulation in the male genito-urinary tract.

Nor will we discuss the phase in which microorganisms are found in the blood stream in the well recognized diseases, such as typhoid fever, pneumonia, relapsing fever, bacterial endocarditis, etc., except to use some of the information obtained to throw light on the sequence of events in various forms of septicemia.

It is the bacteremia occurring in the course of so-called septicemia, which, I believe I am expected to discuss. And I have taken for granted, that as practitioners of medicine and surgery, you have in mind renewing your acquaintance with some of the well known experiments which throw light on the sequence of happenings in disseminated infections. I assume that you will wish to hear the prognosis and the methods of treatment discussed, when positive blood cultures are found in patients lying gravely ill with irregular temperatures, with or without chills, rapid pulse, with or

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\*Delivered October 23, 1930.

without metastatic foci. For to quote Sacquepee, "the idea of septicemia corresponds both to a clinical syndrome of general disease and a biological fact constituted by the presence in the blood of one of the recognized pathogenic germs."

What is likely to happen and what he is to do, is the special concern of the practitioner.

Unfortunately, although septicemia and bacteremia are used in most of the medical writing to-day as interchangeable, they have not always been so used, nor are they consistently so used to-day. In the monograph, by Seitz, on the nature of infection in the 3rd edition of the large "Handbuch der pathogenen Mikroorganismen," published in 1929, there occurs, as in the older editions, the following paragraph: "The two conceptions, bacteremia and septicemia must be sharply distinguished. Bacteremia is purely a passive process in which the bacteria pour into the blood from a focus of infection. The blood serves only as a means of transportation for the bacteria. . . . When the exciting agent is not mechanically transported by the blood, but is actively multiplying in the blood current, then we speak of septicemia."

Such a conception has disadvantages. It takes no account of the great capillary fields which form an important part of the circulatory system, in the liver, spleen and bone marrow. It takes no account of the inability of the clinician to recognize the moment when a bacteremia, in the strict sense, passes over into a septicemia.

The distinction is definitely abandoned by Zinsser in his last edition of his Bacteriology. It is abandoned by most writers to-day. Bacteremia and septicemia are used as synonymous. Each year in the medical writings, articles appear which show this usage. In 1928, for example, in the *New England Journal of Medicine*, O'Brien reports a case of gonococcus septicemia with recovery, and a case of recovery from anthrax septicemia is reported from the *Presse médicale*. Both instances might have been spoken of as examples of bacteremia.

Without a mental grasp of the sequence of happenings, when the body is infected with microorganisms, it is impossible to consider rationally, either prognosis or treatment, or this distinction attempted in the definition of certain bacteriologists, between septicemia and bacteremia.

There are two papers recording experiments on animals that I think well worth bringing to your attention even if you are already familiar with them.

In experiments, recorded in a paper by Hobo, the material used was fine India ink and the amount used from 2.5 to 3.0 c.c. The particles were the same size or smaller than staphylococci and the solution was injected into the ear veins of rabbits. The visible mucous membranes immediately became dark gray; at the end of ten minutes the color had disappeared. The animals were killed at periods varying from forty-five minutes to seventeen days after injection. At autopsy, the spleen, the bone marrow and the liver were found to be stained black. The other organs and tissues—the lungs, heart, brain, nervous tissue, gastrointestinal tract and the kidneys were unstained. The microscopical examination showed in the early stages, particles of India ink in the star cells of Von Kupffer of the liver, the sinus endothelial cells and the pulp cells of the spleen and the endothelium of the capillaries of the bone marrow. In the capillary enlargement of the metaphyses of the long bones the particles were so thickly deposited that it was impossible to recognize the phagocytosis. In the kidneys, clumps of the pigment were to be seen here and there. Scattered through the various organs were mononuclear and polymorphonuclear leucocytes filled with black particles.

The precise and interesting experiments made by Wysokowitsch over forty years ago are equally interesting. He used fresh cultures of moulds, saprophytic, pathogenic and non-pathogenic bacteria and experimented on dogs, rabbits and guinea-pigs. Relatively large quantities were injected into a vein; blood was then drawn at intervals of from ten minutes to twenty-four hours; cultures were

taken and the colonies counted. Enormous quantities of spores of moulds (*aspergillus* and *pencillium*) and saprophytic bacteria disappeared with astounding rapidity. Within three hours, millions of bacilli (*Bacillus subtilis*), injected intravenously, had completely disappeared. Bacteria, pathogenic for man, but harmless for the animals experimented on, disappeared in the same way. Thirty minutes after the injection of millions of cocci (*Streptococcus pyogenes*) into the circulation of a dog, only one colony was found in the blood culture; in one and a half hours the blood drawn was sterile. Even after injections, repeated each day for four days, of many millions of microorganisms (*Micrococcus tetragenus*) into the blood of rabbits, only six colonies had grown from the blood culture at the end of twenty-four hours. The disappearance of bacteria pathogenic for the animal, injected in small quantities, was equally rapid. In some instances it was complete: that is, the blood withdrawn from a rabbit, into the blood stream of which anthrax bacilli had been introduced, showed no organisms at the end of twenty-four hours. If larger doses were introduced, there was first a diminution, then an increase, until the bacteria became countless. In a rabbit injected with a large dose of anthrax bacilli, at the end of five minutes, only fifteen colonies were found in the withdrawn blood. At the end of two and a half hours there were no colonies: at the end of forty-six and a half hours, three colonies: at the end of seventy hours, fifty-six colonies: at the end of eighty-four hours, death followed with countless numbers of bacteria in the blood stream. The animal in which no organisms were found in the blood at the end of twenty-four hours, was killed. Cultures from the blood showed no growth; however forty-five colonies grew from a culture taken from the spleen and countless colonies from the liver. In animals that died after an injection of large doses of pathogenic organisms, autopsies regularly showed not only the liver, spleen and bone marrow, but all the tissues swarming with bacteria. The blood itself, in the larger vessels, contained but a small part of the myriads of microbes found throughout the body.

These two experiments show:

(1) That inert particles the size of bacteria rapidly disappear when introduced into the circulating blood and are found deposited, for the most part, in the liver, spleen and bone marrow.

(2) Nonpathogenic organisms are deposited in the same way and are destroyed.

(3) Pathogenic microorganisms in moderate doses are similarly destroyed, but, when more virulent, or in larger doses, multiply in these situations and invade the blood stream; first a few, finally in countless numbers.

The well known sequence of events in infection by spirochetes is also an aid in forming the picture of disseminated microparasites. The course of the disease in rat-bite fever, relapsing fever, syphilis and infective jaundice, show various phases: a latent period, sudden onset of severe symptoms, dissemination in the blood stream, and multiple transitory lesions and finally, disappearance of the microparasites and destructive lesions.

In experimental syphilis in the lower monkeys, even when there are no general manifestations, examination of the pulp of the spleen, the liver and the bone marrow after death, shows abundant treponemata even when the animal, during life, was apparently in perfect health.

Dissemination takes place from germs multiplying in these regions; the liver, the spleen and the bone marrow.

General infection by bacteria follows the same sequence.

By the time the general invasion occurs, the body has acquired a heightened capacity for destruction of the microparasites. The body's reaction to the invading microparasites has altered both locally and generally. The violent reaction, made evident clinically by fever, is an evidence of the destruction of the multitudes of microparasites. If the body cells hold in check the microbes, then a third stage is reached, with local lesions in the body and a more pro-

nounced reaction. The blood becomes powerfully bactericidal to the organisms causing infection, microorganisms entering the circulation are rapidly destroyed.

In most infections there is an initial lesion at the point of implantation indicating a local sensitization of the body and a heightened capacity on the part of the cells to react to the invading parasite.

There is a period of generalization when microorganisms are multiplying in the body and invading the blood stream, terminated by widespread destruction of the disseminated parasites.

There is a final period, after the microbes have disappeared from the blood, when local lesions appear from the settling out of the microbes at points of diminished resistance. These periods pass into one another and overlap one another, and are often made indistinct by reinfection and secondary infection.

When a lesion has become established in, or on, the walls of some portion of the circulatory system, during the final period, microorganisms may be poured into the circulating blood and time after time be destroyed.

A few clinical examples will illustrate these points.

Bacterial contamination of the blood stream is not infrequent following infections of the middle ear. The mastoid cells are in close proximity to the lateral sinus. It has long been recognized that infective thrombophlebitis occasionally follows infection here, either by direct involvement of the walls of the sinus or by extension to the sinus through one of the minute communicating veins and that such involvement is made evident clinically by chills and fever. Cultures taken during these periods very frequently show the presence of streptococci in the blood stream. The prompt ligation or removal of the infected vein stops the process and the patient recovers. Although large numbers of pathogenic streptococci have been poured into the blood, they disappear completely and the patient recovers if the

bacterial showers stop spontaneously or are cut off. The blood is bactericidal; the body cells destroy the microorganisms. I asked, not long ago, a distinguished and able otologist, who has ligated or excised the interjugular many scores of times, what had become of the hundreds of thousands of bacteria that had already poured into the blood stream before the infected vein was shut off, and he said he had not the slightest idea.

These patients present examples of bacteria disseminated in the blood stream by lesions in the vascular system, after the body has acquired an altered reaction, a heightened capacity for the destruction of the microorganisms causing the infection. If untreated, unless the primary lesion is very small, the bactericidal power of the blood gradually becomes less and less, the bacteria live longer in the blood, they gain a foothold in various parts of the body, myriads are finally poured into the blood stream and the patient succumbs.

A very different picture is seen in the following case report: A woman caught her wedding ring on some object and tore her finger badly. The wound was sutured. She entered the hospital with gangrene of the finger. Her temperature on admission was 99; the next morning the temperature was normal. The gangrenous finger was amputated, the skin closed except about the exit of a small drain. The first forty-eight hours after operation the temperature was  $99\frac{1}{2}$  to  $100\frac{3}{5}$ . At eight P. M. on the second day the temperature was  $100\frac{1}{5}$ . It then rose until her death at noon of the third day. Cultures from the heart's blood showed streptococcus hemolyticus.

In this instance, before the finger was amputated, streptococci had passed into the circulating blood. The virulence of the streptococci, or the lessened resistance was such, or, to put it in another way, the lessened capacity for bacterial destruction was such, that they gained foothold in spleen, liver and bone marrow, and invaded the blood stream.



Osteomyelitis furnishes another instructive clinical picture. Staphylococcus osteomyelitis is one of the lesions of staphylococcus septicemia. At the beginning of the disease the blood culture is usually positive. The sequence of happenings is often as follows: A child has a small furuncle or small infected wound. After several days or weeks, often when the initial lesion has healed, there is a violent general reaction, chill, fever, prostration. Staphylococci are found in the circulating blood and purulent foci appear in various parts of the body, especially in the expanded position of the shaft near the epiphyseal line where the experiments of Hobo show particles of carbon were deposited in the largest amount.

One sees patients in whom osteomyelitis is only one of many purulent lesions found in the body, others in whom only a single bone is involved, and still others in whom two or more bones are involved. Moreover, when the microorganisms are arrested and start to grow, they may set up a marked lesion in one place and a very slight one in another. Finally the circulating cocci disappear from the blood and localized lesions occur with death of tissue. I give briefly a clinical history: A boy two years old was operated on for a painful swelling over his third metacarpal bone. He presented the usual picture of chronic osteomyelitis. His history was as follows: Eight months before he had had a phlegmon following an infected wound on his forehead. After this he became very ill with signs of broncho-pneumonia, which was followed by an abscess on the back of his hand in the region of the present swelling and in the lateral thoracic region. A positive blood culture showed Staphylococcus aureus. The abscess on his hand and the one in the lateral thoracic region were incised and cultures of Staphylococcus aureus were obtained. He developed evidences of pericarditis; 18 c.c. of purulent fluid growing staphylococci were aspirated; ascites appeared. Aspiration showed straw colored serum; cultures were negative. The patient had had an acute staphylococcus sepsis with an abscess in the subcutaneous tissue, purulent pericarditis and osteomyelitis. At opera-

tion eight months after the onset the usual signs of chronic staphylococcus osteomyelitis were present. The various foci in the body had healed; only where the lodged cocci had caused gross tissue death did infection persist. After removal of the necrotic tissue, the patient recovered. Seen nine months later he was in perfect health, fat and rosy. A year later a staphylococcus abscess was opened in the shoulder region and after several weeks healed. At present he has a painful area over the middle shaft of the humerus. The X-ray shows thickening of the periosteum at this point. He has a low grade residual infection of the humerus.

The illness of the King of England was given wide publicity and furnishes another clinical picture. He suffered from a streptococcic septicemia which finally localized in the base of the right lung and which was followed by empyema. A rib was resected and he has slowly recovered. To quote from the London letter in the *Journal of the American Medical Association*: "In the first phase of this severe illness, gradual in its onset, there were noted general infection with imperfect localization; little or no cough and only one small patch of pleuritic friction; a blood culture positive for streptococcus, and an irritative state of the nervous system which produced profound distress and a sense of illness. Toward the end of the first phase came an accentuation of pleuritic friction, which extended into the diaphragm. The second phase was one of increasing toxemia with dusky appearance, dry cracked tongue, periods of delirium and exhaustion—in short, a clinical picture resembling that of severe typhoid in the third and fourth week, but with the added anxiety of attacks of dyspnea and cyanosis due to strain on the heart. With the next phase came an abatement of fever and some evidence of localization. The blood culture was now negative, and toxemia was less with delirium subsiding. The localization in the right lung did not result at this stage in effusion as was shown by puncture and excellent roentgenograms. A few days later the temperature rose rather abruptly to a higher level, and on December 12 there was

evidence at the extreme right base of an effusion which had begun between the lung and the diaphragm. Drainage by means of rib resection was performed on the same day under general anesthesia—gas, oxygen and ether. The prominent organism in the empyema was found to be identical with the streptococcus found in the blood.”

It is unnecessary to give further examples. Our conception of septicemia, built up by clinical observations made when pathogenic bacteria are detected in the circulating blood, must take into account all these cases. Examination of the contaminated blood gives but small indication of the complex phenomena taking place. The number of microbes discovered may be but a portion of the myriads in the body or may only indicate the passage of hundreds of thousands on their way to destruction.

The forecast of the patient's fate can only be made by considering the entire clinical history in connection with the blood culture.

It is not necessary to be hopeless when pathogenic germs are found in the blood current. In many patients the germs are poured into blood powerfully bactericidal. In many the germs are found in early stages of disseminated infection, which will pass on to localization and recovery.

The outcome in any given case depends on the number and virulence of the bacteria, the resistance of the host and the character of the focal lesions.

An attempt might be made to base an opinion on the number of colonies found in the blood cultures. It is self-evident that a single colony found on a single plate must have a different significance from hundreds of colonies found on every plate, but only by repeated examinations and a comparison of a number of similar cases can an indication be given regarding prognosis, and whether or not the bacteria are pouring into the blood stream with bactericidal properties, or are multiplying in the liver, spleen and bone marrow.

These facts also furnish a guide for intelligent treatment.

Obviously, proper nursing, rest, administration of fluids and careful observation are measures applicable to all severe illness. I shall only refer to measures especially called for in septicemia.

The ligation and excision of a vein, the seat of suppurative thrombophlebitis, if done early, is a most satisfactory measure. Here, as we have said, the bacteria are passing into a blood stream which has bactericidal properties, shutting off further contamination.

Unfortunately there is only one region in the body where the anatomical relation and arrangement of the infected area and the tributary veins offer suitable conditions for surgical interference. I refer to the mastoid cells, lateral sinus and jugular vein.

There were ten recoveries and three deaths in a series reported from the otological service of St. Luke's Hospital. In the ten patients that recovered, eight had the jugular ligated immediately after the streptococci were discovered in the blood. There were two patients that recovered without ligation; in one there was only a single culture showing one colony. Two were instances of severe blood stream infection with hemolytic streptococci. Both recovered after ligation.

A similar condition occasionally occurs in an area of infection in an extremity. Amputation above the infected area is followed by complete and startling recovery. An observation of Dehelly is interesting. He amputated the leg of a fireman for an infected compound fracture. The patient continued ill and repeated examination showed hemolytic streptococci in the blood. He reamputated through the thigh. The patient promptly recovered. Thereafter the blood cultures were negative. A most painstaking examination of the amputated stump showed suppurative thrombophlebitis of a single vein.

In puerperal sepsis the effort to remove the uterine with the ovarian veins which at times show suppurative thrombophlebitis has met with little success. In most instances we are dealing with a suppurative thrombophlebitis occurring in the early stages of dissemination.

In infection of the lips and face with suppurative thrombophlebitis, both the jugular and facial have been ligated to prevent dissemination. Lexer reported a case of carbuncle of the cheek in which there was a purulent thrombophlebitis of the facial and general infection and in which he was able to avoid further metastases and cure the patient by ligation of the jugular.

Two years ago Roeder reported a case in which he records ligation of the angular vein in an infection of the upper lip. The vein was not thrombosed, culture of its walls and lumen were negative. There were no positive blood cultures. The measure was said to be prophylactic. There is nothing to indicate that the patient would not have recovered without ligation.

Attempts have also been made to excise the initial lesion under the impression that the microorganisms are finding their way into the circulation from this primary focus. Such treatment is nearly always unsuccessful, often harmful. The microorganisms found in the blood stream are usually the organisms multiplying far from the site of inoculation.

The study of the treatment of anthrax serves as an illustration. Twenty-four years ago the text books of surgery advised excision of the skin lesion of anthrax, followed by the application of caustics, strong antiseptics, or the actual cautery. Small local lesions recovered after this treatment but the results were not as good as when the lesions were protected from injury, the parts kept at rest, and secondary infection avoided. Apparently in some instances the bacilli seem to have been disseminated by the operation. During the last ten years a powerful anti-anthrax serum has been available and has been used with

and without excision. There is a growing recognition that the disease is often local and shut in by a barrier of cells; that excision may break through this barrier and disseminate the bacilli and may cut out a focus perhaps furnishing antibacterial substances; and that, if the microorganisms are widespread, as is often the case, local excision is useless.

The following English statistics of the Ministry of Health published in 1921 are interesting:

	Cases	Deaths	Mort.P.C.
Serum alone . . . . .	200	8	4.
Excision only . . . . .	397	44	11.1
Excision and serum . . . . .	174	25	14.4
No special treatment . . . . .	29	14	28.3

The secondary lesions that appear early in dissemination are the result of bacteria deposited in special sensitized areas or in areas of least resistance or areas that offer anatomical arrangement unusually favorable for the growth of the microorganisms.

Incision or evacuation of exudate in these instances can have only an indirect effect on the microorganisms in the circulation. Such foci are the result of dissemination, not the cause.

It is a common observation and one confirmed by experience that mechanical interference, during the early stage of infection should be confined to the simplest measures, such as aspiration and simple incision to afford drainage and thus avoid unfavorable pressure from the exudate. It is only after the bacteria have disappeared from the circulation and the local focus is well circumscribed, that incision and drainage show satisfactory results. This was well shown in the streptococcus infections that occurred in several of the camps during 1918. Extensive operation on the chest when there was a thin turbid exudate in the pleura and streptococci in the blood showed high mortality. These patients were suffering from streptococcus septicemia as the multiple lesions at autopsy showed.

Aside from these purely surgical measures which can only be applied in special cases with localized lesions, there are certain general measures in use to-day, such as bacteriotherapy, serotherapy, chemotherapy and the transfusion of blood. My own experience in these fields is limited and my attitude sceptical. I have seen no such convincing evidence of the efficacy of any measure suggested as to feel justified in advocating it whole-heartedly. I shall review therefore a few of the reports published during the last two years. In 1928, Cadham reported the history of eighteen patients with septicemia treated with repeated inoculations of a homologous immune animal serum and repeated transfusions of human serum, with sixteen recoveries and two deaths. The next year Prof. Vincent, of Paris, reported very favorably on a new anti-streptococcus serum, and Dujol, in the same year, reported recovery from a staphylococcus septicemia, after injection of an auto-vaccine prepared from fluid containing pus and staphylococci withdrawn from the pericardium. In January of this year Rosher reported in the *Lancet*, four cases of streptococcus septicemia in which *Streptococcus hemolyticus* was isolated from the blood and in which complete recovery followed treatment with scarlet fever streptococcal antitoxin, and several weeks before Burt-White reported twenty-seven cases with a morality of 29.6 per cent treated in the same way.

I shall offer, after the discussion of the introduction of chemicals into the circulation, reasons for not accepting too readily, the conclusions drawn from these favorable reports.

During the war, Anderson and Richardson, in the *British Journal of Surgery* of 1917 and 1918, reported favorable results from intravenous injection of eusol, one of the preparations of hypochlorite of soda. During the last twelve years similar reports have followed the introduction, intravenously, of other antiseptics; perhaps the best known is mercurochrome. About the time of its introduc-

tion wide publicity was given to the astonishing, or as they were then described, truly wonderful results.

It is well known that valuable as antiseptic solutions are in preventing secondary infection, in sterilizing the skin, instruments etc., there are reasons why their use, when bacteria have become established and are multiplying in the body, is unsatisfactory :

First, any chemical substance which kills bacteria when brought in contact with them outside the body acts by some sort of reaction between the chemical and the protoplasm of the bacterium, an analogy existing between the ordinary chemical reaction between two reagents and the reaction between the antiseptic and the bacterium. The reaction is by no means simple, nor is it the same for the different chemicals, but in all cases it is connected in some way with damage to the surface of the bacterium so that it cannot carry on the normal exchange on which its life depends.

Second, the antiseptic has a tendency to combine with substances other than the bacterium with which it comes in contact. Therefore, the living cells, the various chemical ingredients and albumins in the body unite with the antiseptic.

Third, the antiseptic, just as any chemical, is used up and rendered inert by combining with the various substances with which it comes in contact.

Fourth, to be effective, the antiseptic must come in contact with the body of the bacterium. That is, a germ inside a cell is not killed by the antiseptic if the chemical combining property on which its activity depends is quenched before it reaches the body of the germ.

Fifth, the active cells on which the destruction of the bacteria depend are more delicate than the bacterium. Their surface condition, on which their normal function depends, is even more liable to be affected in a harmful manner than the surface of the bacterium by chemical solutions; the living cells, even if not killed, may be damaged.



All these considerations make it improbable that any antiseptic applied with the idea that it is a simple germicide will be effectual. Notwithstanding these facts, which have been brought out by careful and patient studies, very favorable results continue to be reported from the intravenous injection of antiseptics. In 1930, Harris reported in the *United States Veterans Bureau Medical Bulletin*, that a patient recovered after nine intravenous injections of mercurochrome. The patient was suffering from *Streptococcus viridans* septicemia. The same year Veillon reported in the *Bulletin de Soc. méd. des hôpitaux*, recovery from meningococcus septicemia after three injections of acriflavine hydrochloride solution. In August, 1929, Bernstein reported sixteen cases of blood stream infection in which metaphen, introduced intravenously, had a beneficial effect. All were cases of puerperal septicemia.

The difficulty in interpreting these results is that each case quoted must be carefully studied and analyzed by itself. For example, the cases reported by Dujol as recovering after administration of autogenous vaccine are similar to the one I have reported as recovering without vaccine. Did the patient reported by Harris recover on account of the nine injections of mercurochrome or in spite of it? One case report does not furnish proof of the efficacy of a given form of treatment.

As I have said, there has been as yet, no general recognition of the curative value of any of these measures, yet one cannot dismiss without comment the evidence of sudden and rapid recovery presented in many of the case reports. In certain instances there is evidence of severe disturbances after the introduction of chemicals and after the introduction of serum. Is some form of protein shock a common factor, either from the serum introduced or from damage to body cells by the chemicals? Is the protective mechanism of the body stimulated or reactivated? As one watches the case reports year after year, one is surprised by the similarity of the results from widely different measures and widely different chemicals. Obviously it is diffi-

cult to estimate the value of treatment where such different conditions are grouped together under a single term, and where the sporadic nature of the disease makes the numbers that come under the observation of one observer so limited.

In regard to transfusion of whole blood, there does seem to be a general agreement that it is beneficial, at least temporarily, especially in subacute and chronic cases. Repeated small transfusions seem to be more effective than a single large one. The color improves, the feeling of well being returns, the appetite improves; it seems difficult not to believe that it is helpful in aiding the body to combat disseminated infection.

I have endeavored, in this cursory talk, to interest you in the phases in the course of infection, and to bring to your attention the necessity of bringing a critical attitude (founded on a knowledge of, one might say, the vagaries of septicemia) toward the various measures that are enthusiastically advocated, often perhaps, to the detriment of the patient.

There seems to be a widespread, although erroneous impression that a patient, in whose blood streptococci or staphylococci are found is doomed to death. Therefore recovery following any form of treatment is set down as extraordinary and the agent used extolled.

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# COMPLICATIONS INCIDENT TO INACCURATE OR DELAYED DIAGNOSIS IN SUPPURATION OF THE LUNGS AND PLEURA\*

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When your medical secretary invited me to discuss the complications incident to inaccurate or delayed diagnosis in suppuration of the lungs and pleura, I was much gratified at the prospect of discussing this interesting subject, but on reading the invitation further it specified "from the standpoint of the practitioner rather than that of the surgeon," and my enthusiasm waned somewhat, as I doubted if I could do the subject justice from that aspect, as most of my work is surgical and all of our chest operations at the Walter Reed Hospital are based on the combined findings of the internist, the radiologist, the bronchoscopist and the surgeon. However, on reconsideration I felt that we had learned much that might be of interest to the practitioner, by deductions made from our mistakes and the mistakes of others in the handling of over 400 cases of non-tuberculous empyema, 90 odd cases of tuberculous empyema, and a reasonable number of lung abscesses and bronchiectasis.

Any discussion of the complications incident to suppuration of the lungs and pleura would be incomplete, especially from the practitioner's point of view, without some reference to the acute processes that antedate these complications. The same also applies, even if only superficially, to treatment, as proper treatment of the acute processes is still our greatest asset in prevention of the chronic ones and the complications incident to these.

Empyema has always been an important question for the army surgeon, and if by any effort we can prevent a

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catastrophy like that of 1918 when mortality in our camps ranged from thirty-two to eighty-four per cent, we will have achieved something worth while. In addition to this high mortality there were 970 cases of empyema with discharging sinus at the time of the Armistice, many of whom succumbed later at their homes, while others were passed along from one hospital to another for years, when an early accurate diagnosis with conservative surgery might have solved the problem in a large percentage. From an epidemiological aspect we gained little from our experience in 1918, but from a medical and surgical point of view, it is not so discouraging.

Now, as to who was responsible for the high mortality and complications, whether the surgeons operated too early or too late, or whether the practitioner failed to differentiate between empyema with active pneumonia that should not have been operated upon, or the one that should have been, is not the province of this discussion tonight. What I hope to give you are certain proven facts based on the findings of the empyema commission during the war and those of individuals throughout the country since the war *as to what should not be done*, which, if applied in future epidemics, should lower the mortality in empyema to less than 10 per cent in adults and reduce chronicity and complications to a minimum.

It is questionable if there is any one factor as important in the prevention of the complications incident to suppuration of the lungs and pleura as an early accurate diagnosis, especially when it is based on a carefully taken history, a thorough physical examination and proper analysis of the data obtained.

It has never been definitely determined why there was so much difficulty in obtaining an early and accurate diagnosis in the flu empyemas in many camps during the epidemic. The text book picture was supposed to have led to confusion, and the symptoms that were most constant could be counted on three fingers; that is, dullness on per-

cussion, diminished or absent tactile fremitus and diminished breath sounds. These symptoms, plus the x-ray and the aspirating needle, were responsible for more accurate diagnosis than all other symptoms. This was especially true when aspiration was done at the point of greatest dullness, using due precaution to avoid liver dullness, and when negative in the face of other positive findings was repeated and repeated in many directions. The x-ray was of inestimable value in differentiating between pleural fluid and consolidation as well as in determining the height of the diaphragm on the side to be aspirated. Such symptoms as pain, irregular temperature, chills, leukocytosis, intercostal bulging, cardiac and tracheal displacement, change in fluid level, change in the cardio-hepatic angle, and change in the costo-phrenic angle were present in a certain percentage of cases, but they were not constant, for often where the fluid was encapsulated high up or interlobular, the costo-phrenic angle was not obliterated, the cardio-hepatic angle was not always changed, the fluid level did not shift, the trachea and heart were not displaced, and intercostal bulging was not present.

Some of the confusion has been attributed to the fact that in the streptococcus pneumonia, the leukocytosis irregular temperature and chills are often due to the persistence of intrapulmonary streptococcus infection.

Acute empyema in the first stage, with a purulent exudate present on aspiration, results from an infectious process in which the first stage is a pneumonia with a small sero-fibrinous exudate, and the second stage a pneumonia with a sero-purulent exudate. The mechanical effect of the exudate in the pleural cavity causes compression of the affected lung, pressure on the mediastinum and heart, as well as pressure of the unaffected lung. Symptoms are influenced by the location and amount of exudate; that is, it depends whether it is interlobular in the spinal gutter or free in the pleural cavity, the latter condition being influenced by the character of the exudate, as a serous exudate is usually free in the cavity, while the purulent

exudate is nearly always encapsulated, due to deposit of fibrin at the periphery. The actual primary location of the empyema is supposed to depend on rupture of a small subpleural abscess.

In acute empyema it is imperative that we determine whether the etiological factor is the hemolytic streptococcus, the pneumococcus, or the tubercle bacillus before surgical measures are undertaken, because the hemolytic streptococcus tends to produce a low vital capacity. The low vital capacity present in hemolytic streptococcus infection makes a free opening in the chest dangerous in the early stages of the disease, as the sudden change from normal negative intrathoracic pressure to abnormal atmospheric pressure may prove fatal from collapse and mediastinal displacement, as this type of case in the early stages is often cyanotic, suffering from air hunger to such an extent that they have difficulty in receiving their tidal air and, as pointed out by Graham, even a minute opening in the chest may prove fatal, as the pneumonic process has already infringed on the air space and reduced it to a minimum by extensive occlusion of the bronchioles, both by actual plugging with exudate and by edema. Owing to the fact that the exudate often appears as early as the fifth day in this form, the respiratory and circulatory embarrassment may have to be relieved by aspiration until the pneumonia has subsided and the fluid has become purulent and rich in fibrin, when one of the recognized negative pressure operations can be done with practically no mortality. On the other hand, with an early open thoracotomy in such cases, fluid escapes, air rushes in, lung collapses, and death often ensues from mediastinal disturbances or toxemia incident to the still active pneumonia.

The condition is different when we are dealing with empyema due to the pneumococcus, for in this type the pleural fluid is rich in fibrin, insures early adhesion of the pleural surface which stabilizes the intrathoracic viscera, important in preventing post-operative lung collapse and mediastinal disturbance. Usually when the exudate

is recognized, the active pneumonia has subsided, and we are dealing with a condition we hope for when we delay operation in a hemolytic streptococcus pleuritis and when we wait for the fluid to become purulent, and for this reason it is important that we know the bacteriology of each case. Before the late war an early thoracotomy was used rather generally and often with good results when used on the type due to the pneumococcus, but when used in the early stages of the hemolytic streptococcus type, the results were often as disastrous as they were in our camps in 1918 when the mortality was prohibitive, the complications legion, and many of the 970 cases with discharging sinuses at the Armistice were of this type and treated by an early open thoracotomy.

In tuberculous empyema the general practitioner can, by a carefully taken history and a thorough physical examination, do much to simplify the diagnosis. It is, as you know, a form of suppurative pleuritis, in which the tubercle bacillus is the only etiological factor, but often invasion by other organisms results in mixed infection. The greatest tragedy that can befall the closed tuberculous empyema patient with sterile exudate in the chest cavity is to subject him to an open thoracotomy operation, which always means mixed infection and much unnecessary radical surgery that these patients, already handicapped by tuberculosis of one or both lungs, should not be compelled to undergo. However, a mixed infection might be unavoidable when it is accidental from aspiration or when metastatic. In diagnosis of tuberculous empyema history is most important; that is, a history of previous pleurisy, tuberculosis of other organs, peritoneum, or lungs adds weight to the diagnosis when a sterile fluid is found in the chest. The undrained sterile purulent exudate in the pleural cavity with fever and low leukocyte count is almost always tuberculous. Demonstration of the tubercle bacillus in the exudate is possible in many cases, and animal inoculation, even if slow, is very satisfactory. In open cases pathologic examination of the excised pleura is enlightening.

I will now show the slides of ten cases of tuberculous empyema, which should help demonstrate the tragedies incident to inaccurate or delayed diagnosis in tuberculous empyema. They represent a five year follow-up in ten cases that were either bacteriologically or guinea pig positive for the tubercle bacillus.

*Group No. 1*—Five cases with sterile purulent exudate in the closed chest cavity and no active tuberculosis in the so-called good lung. No open thoracotomy or mixed infection. Sputum negative for tuberculosis. Exudate positive for tuberculosis.

*Group No. 2*—Five cases. All five had an open thoracotomy with mixed infection and multiple operations before admission to the Walter Reed General Hospital. No active tuberculosis in the so-called good lung. Sputum negative for tuberculosis. Excised pleura positive for tuberculosis.

All of the cases in Group No. 1 are living and in good physical condition at the end of five years.

Of the cases in Group No. 2, 60 per cent are dead at the end of five years, many showing beginning loss of weight at the end of three years. The remaining 40 per cent now living show, as you can see, marked emaciation.

It was my intention to show the slides of twenty of these cases, but found it would be impossible to present that number in the brief time allotted. However, the slides of these cases should be sufficient to demonstrate the tragedies incident to open thoracotomy in tuberculous empyema cases. Time will not permit of my going into detail relative to mixed infection in closed tuberculous empyema cases, with mixed infection of metastatic or accidental origin, other than to say that they should be sterilized, if possible, by the closed or negative pressure method, and their cavities should then be obliterated by extrapleural thoracoplasty.

As to the prognosis in tuberculous empyema in patients with active tuberculosis in the so-called good lung, it is



difficult to determine, as everything depends on the progress of the tuberculous process, but usually those not subjected to an open thoracotomy live longer.

The treatment of chronic non-tuberculous empyema is more or less standardized and the mortality has been reduced to less than 9 per cent by the many-stage open method of treatment, as shown by the lantern slides, which are self-explanatory.

A word as to the complications incident to the chronic form—I would like to add that many are profoundly septic, depressed mentally and physically, fingers clubbed, joints swollen, heart, kidney and other complications suggestive of amyloid changes incident to prolonged suppuration.

The usual picture is that of one or more cavities with thickened sclerotic wall over a lung that may be collapsed. The intercostal spaces are narrower, the ribs are more vertical, the thorax is retracted, and chest wall is often traversed by sinuses. These slides demonstrate the open many-stage operation for chronic empyema and the results obtained.

*Acute Lung Abscess*—In this condition, as in acute empyema, the proper treatment of the acute is still our greatest asset in prevention of the chronic, and this is especially important since the surgery of the chronic lung abscess is anything but satisfactory, and the mortality is still high, except in those cases where a single abscess is located superficially, and in selected cases suitable for lobectomy.

Before discussing the treatment of acute lung abscess, I want to mention some outstanding points in pathology and symptomatology which might be helpful to the practitioner in diagnosis and the surgeon in treatment. Acute lung abscess is seldom primary, usually being associated with other chest conditions. About one per cent are due to foreign bodies. Prior to the war we considered pneumonia as the prime factor in the etiology of acute lung abscess. This we now know to be incorrect, and that most

of them are post-operative, following chiefly abdominal and tonsil operations, though they may occur after any operation, whether performed in a clean or septic field. They may be parenchymatous or endo-bronchial, single or multiple. The single abscess is usually in the lower lobe and more common in the right lung than the left. In pneumonia the abscess begins in the area of consolidation, which is also true of abscess resulting from septic embolism, the emboli first producing an infarct.

In acute lung abscess there is an area of coagulation, necrosis, and partial liquefaction that is surrounded by an area of intensive hyperemia and edema. Later the cavity may be filled with pus that varies in odor and consistency. At this stage there may be no well defined wall, the cavity being surrounded only by a zone of necrotic lung tissue, which is surrounded by a zone of hyperemia and congestion. When the abscess becomes chronic it is surrounded by a well defined connective tissue wall, which is penetrated by bronchi. Whether lung abscesses are embolic or respiratory in origin has never been definitely determined. If the abscess is post-operative the symptoms may appear within twenty-four hours, or they may not develop for a week. Symptoms may appear early or late, usually beginning with fever, cough, profuse expectoration and pain if the abscess is close to the pleural aspect. The fever is intermittent with chills; there is sweating and a high leukocyte count. The condition is often mistaken for pneumonia before the sudden expectoration of a large quantity of sputum, and sometimes difficult to differentiate from an encapsulated empyema that connects with a bronchus. The real physical signs of lung abscess may be present only after the cavity is evacuated; that is, tympany on percussion, whispering pectoriloquy and amphoric breathing. The abscess may terminate by rupture into a bronchus, or rupture into the pleural cavity and cause an empyema, or it may rupture into both pleural cavity and bronchus. Inadequate drainage may lead to chronicity, general sepsis, hemorrhage, gangrene, brain abscess and other complications.

The proper early application of postural drainage will greatly increase our present percentage of cures. This cannot be carried out by a rotating personnel, because a sufficient number of postural changes necessary to keep the patient free from that sense of irritation and fullness that precipitates coughing spells must be made, which requires a close observation of the patient.

For the proper application of postural drainage an early diagnosis is imperative and should start at once when drainage is established between the abscess and the bronchial tree while the lung abscess is still amenable to collapse and before a definite connective tissue wall prevents collapse. The slides shown here represent the results obtained when postural treatment was instituted early; when I say early I mean immediately after the patient expelled a large amount of sputum during the act of coughing, especially when this expulsion of a large volume of sputum is preceded by a period of respiratory symptoms with fever, cough and leukocytosis, and where an encapsulated empyema secondary to a pneumonia can be eliminated.

The treatment of chronic lung abscess has been sufficiently illustrated by the lantern slides. The prevention of chronicity by proper treatment of the acute has been purposely emphasized.

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# ACUTE INFECTIONS OF THE GALL BLADDER AND BILIARY TRACT\*

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Gall bladder inflammation and gall stone disease has been recognized for centuries. But the clinical picture and diagnosis of these conditions was not recognized until the last century.

A careful history and a thorough physical examination are the most reliable and the most practical of the various diagnostic measures applied to the biliary tract. The reasons for this are that the biliary tract and the factors that produce its diseases are more amenable to analysis and accurate localization than any other tract unless it be the urological. The factors of gall bladder concentration, inflammation and obstruction, in relation to the part of the gall bladder or bile passages in which one or more of these factors is active determine the clinical picture. As an example: If during a pregnancy the cholesterol, which is in excess in the bile, becomes concentrated in the gall bladder beyond the saturation point, a pure cholesterol stone is precipitated and may remain as a silent stone for months or years. However, if it becomes impacted in the cystic duct, the factor of obstruction is added and a hydrops of the gall bladder will result if the factor of obstruction persists in that part of the gall bladder. If in addition the factor of infection and inflammation is added to the previously existing two factors in the same part of the tract, an empyema will result, giving a different clinical picture and demanding a more urgent therapy.

Permutations and combinations of these three factors in the several parts of the biliary tract, make the study of its diseases a most fascinating one. I have noted for

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many years that if the subject is presented in this way to the medical student, his attention is immediately focused and instead of a jumble of unintelligible Greek terms like cholangitis, cholecyst-duodenostomy, the subject becomes one of the most interesting and logical in abdominal diagnosis.

Therefore again I wish to repeat that a careful history and physical examination are the most important features of the diagnosis of biliary tract disease. In recent years, however, the experimental work of Rous, Graham, Whitaker and others, in demonstrating the concentrating activities of the normal gall bladder and applying the use of halogen derivatives to the roentgenographic demonstration of the gall bladder, has added a most valuable method to accurate and early diagnosis of gall bladder disease, and in many atypical or obscure digestive disturbances, gall bladder disease is shown to be the only lesion present. I should say that in the majority of well-established gall stone or gall bladder diseases the cholecystogram is not necessary to the diagnosis—certainly before its introduction by Graham in 1924, we were able to make correct diagnoses in over 75 per cent of the cases—but in the obscure case and in the field of differential diagnosis of upper abdominal lesions, cholecystography is invaluable, and when possible should be used.

I have digressed from the topic of my paper purposely to lead up to the statement that the great majority of acute gall bladder and bile tract inflammations are superimposed upon chronic lesions and with few exceptions after gall stones have formed. That is, the acute phase usually appears long after the patient has been the victim of colic and interval digestive disturbances such as bloating, belching, and a sense of oppression in the upper abdomen.

How often in the presence of this background, when a patient comes down with a severe colic and a superimposed acute inflammation he is told by his physician that he is suffering from "acute indigestion." This is no news to the

patient, for he knows only too well that he is suffering and that his indigestion is acute. But that he should be made to feel that his trouble is merely a symptom and that the physician should, on that assumption fail to note an increasing tenderness and rigidity, and allow his patient to go on to a peritonitis or cholangitis is one of the unpardonable sins of our profession. If in the early stages of an acute cholecystitis, the process is recognized, and proper treatment is applied, many cases will subside and surgery deferred to a more favorable period of the disease.

In presenting the subject of acute cholecystitis, I have utilized the material and the experience of a general hospital, to which patients are sent by the practicing physician and cared for by members of the surgical staff.

The study comprises the data from 160 cases of acute cholecystitis operated upon at the Presbyterian Hospital during the period of 16 years since the establishment of our Unit Record System. These are unselected consecutive cases coming in on a general surgical service. During the same period we have operated upon 1600 patients with chronic cholecystitis with and without stones. That is, the acute cases comprise about nine per cent of the inflammatory diseases of the gall bladder. This corresponds fairly accurately with the figures of other clinics. Thus Graham reports 7.6 per cent of acute cholecystitis in their gall bladder series at the Barnes Hospital in St. Louis.

Acute inflammation of the gall bladder reveals itself in many forms, depending upon the factors of obstruction and inflammation and the part of the gall bladder involved—as previously stated. To make too many subdivisions such as acute catarrhal, suppurative, gangrenous cholecystitis is a mistake. As we understand acute cholecystitis it is a lesion showing edema, polymorphonuclear infiltration of the various layers of the wall of the viscus, with or without stones, with or without preceding chronic inflammation. The lumen may or may not contain pus. There may or may not be a pericholecystitis. As in other acute in-

fections, the onset is usually sudden, at times with a chill. Usually there is nausea and frequently vomiting. Pain is almost invariably present, usually of a continuous aching type, though there may be, and often is, the associated very severe gall stone colic. The temperature is usually around 101 degrees. Physical examination usually reveals a tender mass in the right upper quadrant, and with peritoneal involvement, involuntary upper right rectus rigidity appears. If the cystic duct obstruction by stone or edema of the gall bladder persists, if it is distensible it becomes larger, more tender, more easily palpable. If it has been the seat of long standing chronic inflammation, it is more liable to pericholecystitis and omental adhesions, with less easily palpable mass. Slow perforation with subhepatic abscess is more liable to occur. In the non-calculous acute gall bladder, or one that has not been the seat of previous chronic inflammation, perforation when it occurs results in a rapidly spreading peritonitis. Fortunately this is a rare occurrence.

It is the symptoms of pain and interval digestive disturbances that cause confusion in upper abdominal diagnosis. Pain in gall bladder and biliary tract disease is more frequent in women; it usually comes at irregular intervals, unrelated or without any regular chronological relation to food intake, as is the case in gastric and especially in duodenal ulcer. It is not relieved by taking food. It is more commonly associated either immediately or in the interval, with a sense of bloating and actual belching. The pain usually radiates to the scapula or to the back; it frequently ceases abruptly. Nausea and vomiting are usually limited to the onset of the pain and do not bring relief as regularly as in ulcer. The vomitus, as a rule, is greenish and is not characterized by fresh or old blood as is so frequently the case in ulcer or gastric cancer.

The interval digestive disturbances of biliary tract disease are usually described as a sense of bloating and of fulness or a lump in the epigastrium or left upper quadrant, whereas in ulcer or carcinoma of the stomach the

epigastric distress is of a burning, gnawing type. In the former, belching of volumes of gas is typical; in the latter, eructations are usually associated with the bringing up of sour, acrid or burning stomach contents. The pain in pancreatic disease, rarely unassociated with gall bladder or biliary tract disease, is epigastric and usually radiates directly through to the lower dorsal or upper lumbar region. Such pain, with tenderness extending across the upper abdomen, indicates a pancreatitis, and is frequently found in long-standing biliary tract disease.

A right-sided renal infection, especially a pyonephrosis, may be confused with an empyema of the gall bladder. In such cases there is usually a history of pain radiating from the back down to the groin or genitals and a history of cloudy urine. The finding of a large, tender mass in the right upper quadrant may be very suggestive of a large tender gall bladder, but a pyonephrosis usually can be felt by bimanual palpitation; tenderness is usually marked in the right costovertebral angle over the 11th and 12th ribs. Urinalysis, if repeated, usually shows gross or microscopical evidence of pus or blood in the urine, or if none is present, cystoscopy will reveal a non-functioning right ureter.

A right subhepatic abscess may be difficult to differentiate from an acute cholecystitis or empyema of the gall bladder. Such an abscess may be secondary to a duodenal, appendiceal, perinephritic, or gall bladder lesion. Here the history is most helpful in determining the initial focus. Too much time should not be spent, however, in determining the primary focus with the signs all pointing to an acute abscess in the right upper quadrant. The indications for drainage, if they are clear, should be met promptly.

There are, however, certain lesions which are at times readily confused with acute gall bladder and biliary tract disease and which in every way contraindicate surgical therapy. These are pneumonia, acute pleurisy, certain



heart lesions, catarrhal or infectious jaundice, certain lesions of the liver, such as acute yellow atrophy, cirrhosis, and syphilitic hepatitis, and rarely herpes zoster and Pott's disease. The mere enumeration of these varied lesions emphasizes the importance of a careful history and a thorough general physical examination. The severe right-sided pain of a diaphragmatic pleurisy, with or without a pneumonitis, may simulate the right upper quadrant pain of an acute cholecystitis. The history of an associated upper respiratory tract infection, the finding of a concurrent coryza, tonsillitis and bronchitis, with the presence of rapid, restricted respirations, a to-and-fro pleural friction rub on the lower right chest, with or without signs of beginning consolidation, should always give pause to any thought of surgery. Such a patient must be watched, and even if an acute gall bladder condition is present should be treated conservatively. In pneumonia the rapid, grunting respiration, working of the alae nasi, and high leukocytosis, even when chest signs are absent, are warning signs pointing to a chest lesion and demand a watchful attitude.

In certain heart lesions associated with acute cardiac decompensation, pain and tenderness in the right upper quadrant may simulate an acute liver or gall bladder infection. But the history of rheumatism, long-standing heart disease, the presence of orthopnea, dyspnea, cyanosis, rapid tumultuous heart action, cardiac enlargement, a tender, enlarged liver, leave no excuse for a mistaken diagnosis.

In addition to the tender liver associated with the decompensated heart, certain patients with coronary thrombosis complain of great epigastric and upper abdominal pain together with tenderness in these regions. They may also show a leukocytosis. These patients, however, as a rule, give a history of previous heart disease, are usually dyspneic, with rapid and sometimes irregular pulse, and frequently complain of precordial pain as well as epigastric pain. The sign which is pathognomonic of coronary thrombosis and distinguishes it entirely from acute lesions

of the upper abdomen is the appearance of the friction rub over the pericardium. The to-and-fro "shuffle" should be looked for in every case giving a history of previous heart disease. It may be transient, so that repeated examinations are necessary to detect it.

Catarrhal and infectious jaundice usually occur in the young adult and come on without previous history of similar attacks; pain is, as a rule, not associated. In certain forms of infectious jaundice merging into mild acute yellow atrophy, a tender liver with deepening jaundice may be present. In such cases the decrease in size of the liver, with an increase in jaundice and appearance of mental dulness or psychosis, points to a non-surgical lesion.

The analysis of our series of acute gall bladder infections at the Presbyterian Hospital between the years 1916 and 1930 shows among other data the following points:

SUMMARY OF FINDINGS IN 160 CASES OF ACUTE CHOLECYSTITIS OCCURRING IN 1860 CASES OF BILIARY TRACT DISEASE—9%.

Sex	Incidence	Females 115	Males 45	
Age	Incidence	Females	Males	Total
10-20		2	0	2
20-30		8	5	13
30-40		19	6	25
40-50		29	12	41
50-60		38	11	49
60-70		15	6	21
70-80		4	5	9
				<hr/>
				160

Patients giving history of initial attack—25.

The others had had from 2 to 60 attacks of severe colic over periods of 1 month to 20 years.

The average temperature on admission—101 degrees.

Jaundice present in 22 cases.

CHOLECYSTECTOMIES—69

Died .....	7	Operative mortality—10%
Followed .....	47	Average follow-up period 40 months
Not followed .....	15	(Private cases)

Optimum result .....	444	31-66%
Symptomatic cure .....	54	39-83%
Symptomatic failure ....		5-10%
Hernia Ao .....		8-17%

## CHOLECYSTOSTOMIES—91

Died .....	15	Operative mortality—16.5%
Followed .....	67	Average follow-up period 24 months
Not followed .....	9	(Private cases)
Optimum result .....	444	21-23%
Symptomatic cures .....	54	33-36%
Symptomatic failures ...		21-23%
Hernias .....		8-8.8%
Mucous fistulae .....		16-17.5%
Cases re-operated with cholecystectomy—		20-22%

## OPERATIONS

Cholecystectomy .....	69
Cholecystostomy .....	91
Choledochostomy .....	16

## MORTALITY

With Cholecystectomy 7 deaths .....	10.0%
With Cholecystostomy 15 deaths .....	16.5%

## COMPLICATIONS

Pneumonia .....	7
Peritonitis .....	7
Cholangitis .....	5
Diabetes .....	10
Thrombophlebitis .....	3
Uremia .....	6
Sepsis .....	4
Bacteriemia .....	2
Myocarditis .....	2
Acute Pancreatitis .....	2

## MAJOR CONTRIBUTING CAUSES OF DEATH

Pneumonia .....	5
Vasomotor Collapse .....	4
Uremia .....	3
Gas Bacillus Infection .....	3
Sepsis .....	2
Pulmonary Embolism .....	1
Hemorrhage .....	1

## PATHOLOGICAL FINDINGS

Stones in 130 cases .....	81%
Pus in Gall Bladder—118 cases .....	75%
Perforated Gall Bladder—30 cases .....	19%
Acute Pancreatitis—2 cases	

## BACTERIOLOGICAL FINDINGS

Cultures Taken .....	146 cases
No Growth .....	30 "
Positive Cultures .....	116 "
<i>B. Coli</i> .....	61
<i>Enterococcus</i> .....	19
<i>Staphylococcus</i> .....	14
<i>Hemolytic Streptococcus</i> .....	6
Typhoid .....	3
Paratyphoid .....	3
<i>B. Proteus</i> .....	4
<i>B. Welchii</i> .....	3
<i>B. Oedematis</i> .....	2
<i>B. Friedländer</i> .....	2
<i>Pneumococcus IV</i> .....	1
<i>Pyocyaneus</i> .....	1
<i>B. Mucos. Cap.</i> .....	1

*Results in Cases with Disease Limited to the Gall Bladder*

(As seen in a series of 400 consecutive biliary tract cases)

	Cases	Cholecystectomy		Cases	Cholecystostomy	
		Compli-	Died		Compli-	Died
<i>Acute</i>						
With stones.....	21	6	2	10	3	1
Without stones .....	2	1	0	3	1	1
	—	—	—	—	—	—
	23	7	2	13	4	2
<i>Chronic</i>						
With stones .....	185	48	1	6	5	0
Without stones .....	56	20	0	8	2	0
	—	—	—	—	—	—
	241	68	1	14	7	0
<i>Total</i>	Cases	Complicated		Died		
Acute .....	36	11 (30%)		4 (11.1%)		
Chronic .....	255	75 (29%)		1 (.039%)		
	—	—		—		
	291	86 (30%)		5 (1.7%)		

*Results in Cases with Disease Not Limited to the Gall Bladder Requiring Common Duct Drainage*

(As seen in a series of 400 consecutive biliary tract cases)

78 Cases—19 Deaths (24%)—50 Cases with Complications (64%)

	Cases	Deaths	Mortality Rate
Cholecystitis and Common Duct Stone			
the Only Lesions .....	35	5	14 per cent.

Acute .....	8	1	12.5 per cent.
Chronic .....	27	4	15 per cent.
Cholangitis Present .....	13	7	54 per cent.
Acute .....	4	4	100 per cent.
Chronic .....	9	3	33 per cent.
With Pancreatitis .....	28	5	18 per cent.
Acute Pancreatitis .....	3	1	33 per cent.
Pancreatic Lymphangitis .....	13	1	7 per cent.
Chronic Pancreatitis .....	12	3	25 per cent.

Only a surgeon operating on these acute biliary lesions has any conception of the difficulties encountered in these cases. The frequently associated obesity and septic state, the difficulties in anesthesia, the unsatisfactory and hurried operation because of the pathology found and the condition of the patient, the high mortality and the persisting symptoms and mucous fistulæ in so many gall bladder drainage operations necessitating secondary cholecystectomies—all these factors tend to convince the careful and conservative surgeon as well as the physician of the advantages of removing these foci of infection and potential trouble during the interval, at a time when the patient is in good physical condition and prepared for the operation of cholecystectomy.

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# ON THE NATURE OF FITS

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The diagnosis of epilepsy in most of its manifestations is easy; the comprehension of its nervous physiology is obscure and difficult. That epilepsy is not a disease is sure—it is a neural paroxysm in response to noxious stimulation—a broad description to clear the ground for better sight of the problem, that we may see the scope of our essay and the nature of our objective.

The idea of epilepsy given us by Hughlings Jackson is that it consists of an occasional sudden excessive violent discharge of some nerve center, sensory or motor; to which it would seem useful to add that the phenomena produced are independent of will and are accompanied by an alteration in the stream of consciousness. We shall see that even this ample cloak covers but sparsely all epileptic events which occur in such varied circumstances and in such a motley company of diseases that we are forced to the conclusion that the convulsive state and passing changes in consciousness cannot be any primary disease unit in themselves. They are but the expression of an innate or induced instability of nervous centers arising from many causes, operating probably through a common constant connecting mechanism. We must therefore seek out the nature of the agent which permits or elicits nervous explosion—a quest which must range from disorders of circulation to chronic poisoning and the protean appearances of anaphylactic shock. It is necessary to recognize, on the one hand, the essential unity of all episodes of impaired consciousness often accompanied by convulsion, and on the other, the amazing variety of conditions which may cause

such episodes. Such epileptogenous conditions are often fleeting: we must combat with vigor the portentous and often untrue prognosis so frequently saddled on such disorders by the public and many of our profession.

We are so familiar with epilepsy produced through renal disease and the poisonings of an uneasy pregnancy, that by granting such epilepsy special titles, we have obscured the fact that epileptic events in certain individuals follow hard on the heels of intoxications and are curable by the removal of the toxic material. Ignoring these facts, we arbitrarily classify cognate, often identical, phenomena in a category of disaster, whereby the diagnosis of epilepsy has become synonymous with a sentence to perdition. Epilepsy has been described by some of the most eminent writers on the subject as a condition characterized by recurrent convulsions and terminating in dementia. Surely this statement reveals but a fragment of one end of the spectrum of this disorder. True, the context usually attempts to adjust the ill balanced values set out by this description, but the context is apt to be difficult and the definition easy of quotation, the result being the unwisely restricted viewpoint so often taken of the condition and the often foolishly lugubrious outlook imposed on the subject and his friends.

In an attempt to comprehend the abnormal sequences comprised in a convulsive fit, we may first look at the neural mechanism involved and then regard the evidence on behalf of vascular disorders capable of permitting or producing the explosion, and lastly, speculate on the nature of the intoxicating agents initiating the train of events.

Epilepsy has been already described as an occasional paroxysmal discharge of a nerve center or group of centers occurring apart from volition and accompanied by interference with consciousness. Perhaps paroxysmal "impairment" might be a better word than "discharge," for many of the minor manifestations have such negative characteristics as to preclude the use of so positive a descriptive title. Even in the major seizure, the sequence of events

can be most readily understood as a sudden cutting out of the highest level, the cortex, allowing the lower neuronie levels to pour downward an ungoverned stream of tonic postural impulses—in fact, an abrupt rigidity of the decerebrate type. The subsequent convulsions which have secured, by their dramatic quality and their greater duration, more attention than I think they deserve, probably represent the gradual return of cortical control, incapable, at first, of ordered volitional action. I suggested at the beginning of this address that many diverse causative conditions must operate through a common mechanism to produce so constant a result, for my claim is nothing less than a qualitative unity and quantitative difference in the various manifestations of epilepsy, from the major seizure through petit mal, to migraine, to recurrent syncope and periodic endogenous emotional tempests. And in the gamut I should include, without equivocation, the voluminous mental states of unreality, and those prolonged and terrifying experiences known now as vasovagal attacks in which the patient is suddenly terror-stricken, suffers mediastinal oppression, has a feeling of tingling and swelling of the limbs, a sense of impending death and, losing precision of contact with his surroundings, experiences an acute transient seizure of cardiac hurry. Probably the mechanism of the major attacks will be revealed by a study of the manifestations of the minor attacks which will be found, I think, to be fragments of the fully developed seizure—just as we have fragments of the decerebrate posture produced by imperfect mesencephalic block, so we may have fragments of the great fit produced when abnormal conditions, probably of a vascular nature, are not sufficiently violent to unseat the entire cortical function. Such a “fragment” was demonstrated a few months ago in Bellevue Hospital by a young man, who for some years had been afflicted by sudden giving way of his legs on laughing. He had protected himself studiously against this cataplectic mishap by assuming a portentous gravity which seemed experimentally impregnable. However, one morning during rounds he was sitting on the edge of the bed with his



feet dangling and was unwarily provoked to a loud laugh by the remark of a neighbouring negro. Immediately following his emotional explosion, his hands were thrust out in a tonic spasm, the face was tonically convulsed, the lips were cyanosed, and he slid slowly off the bed on to the floor—during his descent the pupils were found fixed and enlarged. His small seizure ended with his fall, he picked himself up and stated he had had no loss of consciousness whatever. The time needed for the whole fit was, however, so short as to make it impossible to prove his statement nor could his reflexes be examined in the attack. Transient losses of the knee jerks, however, have been found by Kinnier Wilson and others in such cataplexies. This type of fit is probably a mesencephalic explosion; the irritated center being the affective control in the thalamus. The narcolepsies are in all likelihood, subthalamie expressions of the same order. A sudden overwhelming disposition to sleep descends on such patients, one of whom told how he would be overcome in a directors meeting in the middle of his own speeches and more oddly still in the middle of intensive courtship.

The vasovagal attack which I have described, if condensed in point of time, would be the same as the phenomena of many of the petit mal attacks, and I can personally vouch for its identity with the sensations felt when, having compressed my carotids and vagi, I lost control of my experiment and, a few seconds later, of consciousness.

Leonard Hill, more intelligently and successfully, compressed one carotid in himself: "the first effect was a sensation in the eye of the same side; then there followed a sensory march of formication down the opposite side of the body. This began in the fingers, spread up the arm and down the leg. Finally, clonic spasms of the hand occurred, accompanied by an intense feeling of vertigo and alarm." Whether clonic movements occurred in my own case, I do not know, as I was alone at the time and have since lacked inclination to repeat the experiment; the sensation in the hands and forearms for the few seconds

before loss of consciousness, was that of very powerful faradization; it was still present on my recovery but quickly passed away.

In connection with these considerations of vascular change, it is proper to remind ourselves of the cerebral phenomena produced by severe heartblock. Thomas Lewis finds that suspension of the mental functions is produced by a single period of asystole of from three to seven seconds' duration. In severer cases, where the pulse ceases for fifteen seconds or more, there occur cyanosis and stertor, and twitching of the face and limbs; fatal status epilepticus is by no means infrequent. In such cases there is a cessation of general circulation, but in the cats operated on by Stewart and Pike, cerebral and medullary circulation only were cut off. The immediate results were unconsciousness and bladder and rectal evacuation, severe tonic convulsions, then flaccidity (it must be remembered that midbrain circulation was obliterated); after the return of circulation there were clonic convulsions which prefaced resumption of consciousness and complete recovery.

In the ability of the emotions to cause severe vasomotor fluctuations and, in certain persons, syncope, and in certain others, headache or minor and major convulsions, we have an approach to a psychologic mechanism in epilepsy, which differs from that impressionistically sketched by Pierce Clark and others.

One cannot leave the subject of vasomotor instability in epilepsy without mentioning the remarkable case published by Osler of Raynaud's disease of the fingers, feet, ears, and nose, occurring during six winters and accompanied only during such seasons by severe epileptic convulsions.

Such events raise again the question of the existence of motor nerves in the cerebral blood-vessels. These were thought for long to be absent, but Gaskell's observations have demonstrated their presence; the muscular walls in

these vessels would seem evidence enough, but Biedl and Cushing have both made manifest that epinephrin blanches the brain as it does other tissues, and Wiggers has shown a definite diminution in the outflowing blood after the addition of epinephrin to the fluid circulating through the brain.

Forbes and Wolff working with Stanley Cobb have lately been able to demonstrate the contraction of pial vessels immediately after the stimulation of the cervical sympathetic nerve and their dilatation after the stimulation of the central end of the cut vagus.

Bernard Wortis in the Bellevue laboratory found blanching of mucous membranes and the cerebral cortex in cats during the moment preceding convulsions produced by the injection of camphor monobromide. MacDonald and Cobb using absinthe made the same observation. John Hartwell and myself were once able to observe the brain of a patient during a general epileptic fit: the exposure of the parietal cortex had been carried out under local anesthesia whereby consciousness and normal reflex activity were retained up to the moment of the attack. The initial sign of the seizure was a sudden whitening of the cortex which was no sooner remarked on than it was replaced by tremendous venous engorgement with protrusion of the brain beyond the level of the bone defect. This alarming engorgement, in which the previously blanched cortex became beet color and many of its veins swelled to half the diameter of one's small finger, was coincident with the tonic stage of the attack and the period of general clonic convulsion. The cortex failed to recover its normal appearance during the remaining twenty minutes of exposure, though its blood-red color was gradually mitigated in that period. The engorgement was apparently a part of the diffused cyanosis consequent on the general tonic spasm; the initial chalky appearance, however, must have been due to a vascular constriction which, I believe, was the proper beginning of the cerebral seizure.

Cushing has shown that faradic stimulation of the cor-

tex produces pallor of the gray matter and it might be well to bear his observation in mind when considering what exactly we mean by the spread of focal attack. Such spread is too slow to be explicable by the passage of a nerve impulse and might well be dependent on a quickly widening area of cerebral anemia. MacRobert and Feinier advanced an interesting theory to account for the fact that generalized epileptic seizures result more often from neoplasms in the temporosphenoidal lobes than from tumor formation in any other cerebral area. These observers believe that the topographical relation of the sylvian artery to these lobes renders the former susceptible to abrupt compression from the transient edemas surrounding the growth; such sudden diminished blood supply they believe, renders the cortical elements unstable, but as I have already suggested, the mechanism may be rather that the cortex is cut out by such an event and lower levels released by lack of adequate control.

Bealtie, Brow and Long, attribute the increased irritability of nerve centers, including the cerebral sympathetic centers, to asphyxia.

Indeed we may assert that the functional stability of nerve cells depends on adequate oxygenation. This may be lowered by reduction of blood-flow—possibly by central sympathetic stimulation—by vascular spasm or vascular sclerosis. Again, this relative cellular anoxemia may be produced by a film of fluid between the cell and its source of oxygen supply—the blood-vessel—this depicts the detail of the morbid process involved in the familiar epilepsies of alcoholism, uremic poisoning, and other forms of general or local brain edemas.

An instance of convulsions caused by cerebral edema, is a physician's child whose fits were coincident with urticarial attacks. These were found to depend on a sensitiveness to milk: both skin and cerebral expressions disappeared with the removal of the noxious protein.

Following up the notion that the initial tonic phase of

the grand attack is due to a stream of ungoverned impulses from the lower neuronic levels, we might remember that, in spinal convulsion due to strychnin poisoning, there is no initial tonic period and that clonic spasms occur from the beginning, whereas from midbrain intoxication by either tetanus or rabies, there occurs engravescient tonicity—lockjaw and risus sardonicus—or tonic convulsion as the first manifestation of disease. It would appear that the discharges of energy produced by strychnin poisoning would be included in the definition of epilepsy advanced by Hughlings Jackson, as would indeed those associated with rigor, simple shivering or that curious somatic tremor which some people experience after micturition. It is for this reason that I have thought it necessary for clinical purposes to make it clear that we consider as medically epileptic, only phenomena associated with alteration of consciousness. It is not desirable to say that, in what Gowers called the borderland of epilepsy, there is impairment of consciousness, for in the voluminous mental state there is often a feeling of expanded receptivity, a subjective enlargement of the orbit of awareness, a sense of pre-science. Indeed, an extraordinary acuteness of reaction to sensory stimulation may occasionally be seen in epileptic persons.

Convulsions could be produced without fail in two patients under my observation. In one, a child, by flicking or sharply tapping the left side of the nose, in the other, an adult, by rubbing the dorsum of the left foot. The attack in the first case consisted in immediate dilatation of the pupils, tonic spasm of the arms and chest, respiratory arrest, cyanosis and slight frothing at the mouth, the whole lasting sometimes fifteen, sometimes twenty seconds, and ending in flaccid exhaustion after return to consciousness. There were no clonic movements in this child whom Dr. Jackson was good enough to come to the hospital to see and whose fit he regarded as a typical bulbopontine explosion.

In my second case, who was under the care of Sir

Farquhar Buzzard, the convulsions were general and followed the usual procedure of a major seizure. The right parietal cortex was exposed in this case without anything of note being revealed.

Jackson reported a case of a boy whose seizure was precipitated by touching his head, a sharp tap or sometimes combing his hair, would cause him to fall suddenly with paled cheeks but without loss of consciousness.

Some years ago, there was admitted to the neurological department of Bellevue Hospital, a boy aged 17 years whose history stated that for twelve months he had been subject to instant falling to the ground on hearing a sudden sound—a horse pawing the ground in a quiet street, a boy whistling behind him—would be enough to produce cramp in the left leg and a quick fall in which he was always bruised. He denied any loss of consciousness and certainly to on-lookers, gave for a long period, no evidence of such. However, after two years of these events, frequently repeated, he had a major convulsion which came on after the slamming of a door and was preceded, as were the other attacks, by a feeling of cramp in the leg. These larger seizures did not entirely replace the fallings after sudden sounds. I induced both types of attack with ease, but did so rather seldom as he would fall violently on his face and, so innocent was he of any reflex of defence, I feared for his safety.

This is an example of the reflex acusticomotor epilepsy described by Oppenheim; for many months, the boy was thought by some competent men to be hysterical. His first fall occurred at school when he was trying to solve a tough problem at the blackboard; his crayon broke and he fell sharply to the ground. His infantile history, however, supplied an organic background if not an organic explanation. Three weeks after birth there was still present a very large caput succedaneum over the right occipitoparietal area. This was opened and a blood clot evacuated. There was said to have been a bone defect in this area at that time. Symptoms of meningitis are said to have been present during the first two weeks of life. When five

months old he had a general convulsion; later, he began to have jerky movements when falling asleep and on waking; in his mother's words: "The left leg would come up and the left shoulder and body go forward; the movement would occur eight or ten times but varied in number and intensity." These hypnogogic events lasted with lessening severity for fourteen years; two or three years later they were replaced by the recurrent episodes just described.

The parietal cortex was exposed. A great thickening of the dura was discovered, produced by an old organized, subdural clot. The attacks have become rare since the operation, and hypersensitiveness to sounds uncommon. This case has been told at some length because of its intrinsic oddness, but also because it shows how cerebral impulses can be short circuited by trauma and react quickly to stimulation by discharge to vasomotor changes.

Trauma, certainly, can render a brain area unstable. Severe skull and brain injuries in War were found to have given rise to subsequent convulsions in 4 per cent of 25,000 cases under review. Wortis has shown in our laboratory that the injured cortex explodes with a smaller dose of a standardized convulsant (camphor) than does the intact cortex. Wilder Penfield (*Brain* Vol. 53 part 2 p. 118) has pointed out the effect of scar tissue in cortical wounds, and believes that cicatricial traction on surrounding blood-vessels is inevitable, and is the cause, by vasomotor reflexes, of the convulsion—the type of which will depend on the location of the scar.

It is needless to discuss here the exact relationship between migraine and epilepsy; they are both found in persons of neuropathic type and heritage; both diseases often occur in different persons of the same stock and very many instances are reported where they existed at different times in the same patient. In a case of my own, the left-sided headache was ushered in by a sensation of flashing lights in the right temporal field, numbness in the right hand, and ingravescent hemianopia, alexia, and aphasia, all of which became practically complete. The subsequent

headache lasted for some hours during which the patient behaved rationally. Following the seizure he had complete amnesia for the period of the attack with the exception of its first half-hour.

Migraine has been reported as alternating in three patients with family periodic paralysis—but it would be futile to list here the numberless forms of equivalents which have been described and are entirely familiar to this audience. Earlier in this address I used the term the spectrum of epilepsy. My general purpose has been to suggest that in this spectrum are many colors which merge insensibly into each other; uremia and eclampsia of pregnancy, the fits of general paralysis and brain tumor are there; the spasmophilic conditions of infancy are also to be thus grouped, including certain forms of tetany associated with alteration of consciousness; the chorea of pregnancy may be in this spectrum also, and—not very deep in the ultra-violet sector—are probably some cases of major hysteria, the motor phenomena of which suggest the temporary abandonment of a cortical for an infracortical mechanism.

In fine, as we have come to allocate destructive lesions of the brain by their focal signs so we may associate the many types of epileptic expression with appropriate neural areas, which have been the objective of vascular attack; for example petit mal is almost certainly an alteration of consciousness from frontal disorder, complex visual, auditory and psychical hallucinations from disorder in the temporosphenoidal lobes, gross color fits or twinkles from disorder in the occipital poles, myoclonic epilepsies from striatal implication, the cataplexies and narcolepsies from thalamic and subthalamic disorder, and the great fit as has been pointed out is a sudden decerebration with a cutting out of the cortical totality followed by a reviving paroxysm of the motor areas.

The researches of Bronson Crothers and Howard Smith (*Amer. Jour. Obst. and Gyn.* pp. 19; 374, 1930) into the frequency of central nervous system injury occurring in the act of birth illuminates an organic morbidity which



has received insufficient attention. You will remember that in 100 spontaneous deliveries there was bloody fluid in 11 per cent; in 50 low forceps deliveries 24 per cent of the cistern fluids were bloody. In five cases of breech extraction there was blood in 40 per cent of the fluids, and when in 5 cases the first stage of labour had lasted over 24 hours it was found that 60 per cent of the fluids were contaminated with blood. The fluids of Cesarean babies were all blood free.

Olken (*Journ. Nerv. and Ment. Dis.* Nov. 1930, p. 544) has been able to show distortion of the cutaneous capillaries in babies delivered by forceps and in those of normal birth; whereas no such distortion could be made out in 17 Cesarean section babies. It was also found that microscopic capillary hemorrhages were found throughout the pia arachnoid after experimental convulsions in dogs.

These clinically indistinguishable birth traumata of the brain may well act directly as agents for the reduction of adequate cell oxygenation in the brain or indirectly by an interference with cerebral vasomotor control through the central sympathetic. At all events such birth injuries must often be capable of lowering the threshold of neural explosion to a point accessible to stimulation by metabolic products, toxic maybe, but innocuous in a subject with a higher threshold of nerve cell irritability.

The act of birth assumes then a highly hazardous and romantic aspect. Death has been called the greatest adventure of life but there is no adventure in a certainty; the real gamble for all of us lies in our entrances, our future lies behind us, and with this knowledge we may be able to do good preventive medicine even in the field of epilepsy with assistance from our obstetrical colleagues.

Once the minute injury has been done our efforts in treatment must reasonably be directed, first to raising the threshold of neural explosion and second, to getting rid of all detonating stimuli likely to reach it.

The first is achieved by the continued use of small doses

of neural sedatives, bromide of course, but still better, phenobarbital. Pavlov (*Conditioned Reflexes* 1927: 10) has taught us how inevitably the neural reflexes become conditioned and to allow fits to occur because of fear of "drugs" is obsessional superstition.

The next is to rid the oversensitive organism of noxious stimulation. To this end have been directed most of the modern therapeutic systems. Lane and Reed when permitted enthusiastically resected the entire colon; other men more conservatively have been content with a bacteriological revision of the great intestine, by providing proper diet, peristalsis and flora. Geyelin in 1921 studied the effects of periodic starvation on epileptics and found that severe fasting considerably reduced the number of attacks and in a small number eventually caused their arrest. From his work has been evolved the plan of producing by a diet very rich in fats, a ketosis similar to that produced by starvation: a child of 58 lbs. on this system should begin by 60 grms. of carbohydrate, 129 grms. of fat and 25 grms. of protein in the 24 hours.

No one program, however, will be successful or even moderately successful in all cases. Nor could we expect one design to be of service against so varied a congeries of symptoms.

An approach to real knowledge may lie in the chemical study of sympathetic nervous system stimulants and toxic protein split products produced by proteolytic ferments.

The humoral pathology—to use Zabriskie's phrase—of the disease must be made comprehensible by anaphylactic studies, and when these things have all been added unto us we must remember to treat the patient as a whole, to adjust his environment and his problems, to arouse his interests, keep fired his zest for living, inculcate discipline and wise habits, and as far as possible allow him to live normally within himself—with fair weather in his soul—and as happily as maybe also in the Society of his choice.

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EXTRACT FROM THE MINUTES OF THE COUNCIL  
OF JANUARY 28, 1931 IN REGARD TO  
DR. HIGHMAN

The Committee on Professional Standards received complaints against Dr. Walter J. Highman because of his name appearing in an advertisement of Woodbury's soap. The matter was thoroughly investigated by the Committee before which Dr. Highman appeared. The report of the Committee was presented to the Council, which after very thorough discussion and consideration adopted the following resolution in accordance with their authority as given in Article IX, Section 1 of the Constitution:

RESOLVED that Dr. Walter J. Highman be reprimanded and suspended for a period of six months and that a notice of this action be published in the Academy Bulletin.

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## STANDARDS FOR OXYGEN THERAPY EQUIPMENT

### COMMITTEE ON PUBLIC HEALTH RELATIONS

Until recently, the employment of oxygen tents and similar equipment for oxygen or carbon dioxide therapy in the private practice of medicine outside of hospitals has been restricted almost wholly to a few physicians who are especially expert in the application of this form of therapy as a result of experience gained in hospital practice. Its application to the treatment of pneumonia and other conditions characterized by an interference with the proper oxygenation of the blood has become so extensive that commercial agencies have now found it profitable to rent equipment to physicians.

The Committee on Public Health Relations has been urged to take steps to acquaint physicians of the community with the information necessary to guide them in the employment of this form of therapy. It is not enough that the indications for the treatment be understood. A physician who expects to use the equipment must understand the mechanical features of the tent employed and know how to judge its mechanical efficiency.

In employing an oxygen tent or other apparatus for the treatment of pneumonia, it should be borne in mind that, by improving the oxygenation of the blood and reducing cyanosis, the rate and character of the respirations are improved, the patient is made more comfortable, and is saved a large amount of work. If the oxygen content of the tent is decidedly above or below the optimum, or if the atmosphere is too hot or too moist, the patient may be made very uncomfortable and the therapy is then capable of doing more harm than good.

I. With regard to the *air conditioning*, it is of utmost importance that:

- (1) The tents should have a capacity of at least eight cubic feet.
- (2) The temperature inside of the tents should be maintainable at or below that of the outer air.
- (3) The concentration of oxygen should be 45 per cent ( $\pm 5$ ) when oxygen is fed at not more than 8 litres per minute during maintenance. Continuous use of concentrations of oxygen above 70 per cent are harmful. For this reason it is necessary that the concentration of oxygen be measured at frequent intervals during the time it is used by the patient.
- (4) The carbon dioxide content should be not more than 1 per cent unless specifically desired.
- (5) The relative humidity should be below 50 per cent, regardless of inside or outside relative humidity or temperature, taking into consideration the fact that the patient in the tent may add as much as 1000 c.c. of water to the atmosphere each day.
- (6) The tent should be serviced in such a manner as to provide at least fifteen air changes per hour.
- (7) All tents should be provided with thermometers and suitable hygrometers readily readable from the outside.
- (8) Tents should be equipped with an apparatus to test the oxygen and the carbon dioxide concentration.

II. With regard to *sterilization of the tents*, all tents should be sterilized after each use by scrubbing inside as well as outside with soap and water. This work could be facilitated and made more effective if the tents were made of double-faced material. After scrubbing, the tent should be dipped in a solution of 1 to 10,000 of bichloride of mercury for five minutes. To prevent incrustation, the tent

should be washed down with water after immersion in the bichloride of mercury. In hospital practice, an alternate method would be the dipping of the tent in a 70 per cent solution of ethyl alcohol. An inexpensive method of sterilization is to expose the tent for 45 minutes to formaldehyde vapor followed by 15 minutes' exposure to ammonia vapor.

III. With regard to the *fire hazard*:

- (1) All tents should be conspicuously stamped, "NO FLAMES, NO SPARKS, DANGER."
- (2) Oxygen ganges should be tested for accuracy before release and be conspicuously labeled "DANGER, DO NOT OIL."
- (3) For the window of the tent, only cellulose acetate or other non-inflammable material may be employed, and cellulose nitrate or celluloid should be specifically forbidden.

IV. With regard to *testing*:

- (1) The basic loss of oxygen of each tent should be determined before rental or sale and stated on an attached tag.
- (2) Oxygen should not be misbranded so as to suggest that it is other than industrial oxygen.

V. A less efficient method of oxygen therapy, which is much less expensive, is the use of the nasal catheter or the nasal tube inhaler with a calibrated gage to fit on a high pressure tank. These should be sterilized before rental or sale, and in the case of rental, sent in a sealed container.

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## DEMONSTRATION OF OXYGEN THERAPY

The exhibit of oxygen therapy held in the exhibition room of the Academy Building on February 9th and 10th proved as successful as had been anticipated. Twenty-one exhibitors demonstrated oxygen tents or other types of equipment employed in oxygen therapy. In addition, two types of portable oxygen chambers were shown as well as respirators and other apparatus used for resuscitation. It is estimated that about 1200 physicians visited the exhibition during the two days. Each afternoon and evening, talks were given by authorities on the use of oxygen.

The exhibit was planned to stress the need for adequate methods of oxygen administration, and to acquaint physicians as well as inventors and manufacturers of oxygen tents, and the commercial firms which engage in the rental of tents and oxygen equipment, with the necessity of appreciating the conditions to be attained or avoided, and with the real menace of faultily designed or operated equipment. Minimum requirements were listed and emphasized, and it was pointed out that a patient in urgent need of oxygen may be made more restless and uncomfortable, and be actually harmed, by being placed in a tent in which oxygen concentration, temperature and humidity are not measured and controlled.

The administrators of hospitals in the metropolitan area as well as individual physicians had the opportunity to compare many types of oxygen tents, reducing valves, and other pieces of apparatus, and to acquaint themselves with their relative advantages and disadvantages for hospital and private use. It was brought out that the use of oxygen has been greatly limited by excessive cost. As a remedy for this situation a reduction of charges was urged, based on standardization and simplification of equipment, in anticipation of wider demand. At the same time the

use of the less expensive nasal inhaler was advocated for the purpose of partially relieving oxygen need, and for the milder cases or where the expense of a tent cannot be met, as well as when tents are not tolerated and an oxygen room is not accessible. The large variety of tents within one room enabled manufacturers to compare the relative advantages and disadvantages of their apparatus with that of others, so that improvement, simplification and reduction in cost will undoubtedly result shortly because of this opportunity. Stereomotorgraphs which showed successively and continuously, at a controlled rate, slides describing the principles of oxygen therapy, illustrated the value of this method of instruction.

The necessity for adequate sterilization of the tents and for protection against fire hazards was emphasized. The representatives of the City Department of Health who visited the exhibit were impressed with the necessity of some official action leading to new regulations of the Department in order to guard against cross infection through improper cleansing and sterilizing.

As a result of the exhibit four commercial firms have entered the business of renting tents to physicians. These firms, as well as others who sell oxygen, will also rent reducing valves so that oxygen may be purchased in high pressure tanks at a fraction of its cost when supplied in the less efficient low pressure tanks on sale at the corner drug stores. Firms which sell oxygen also agreed to discontinue the practice of misbranding their tanks as "medical oxygen" and selling them at a price greater than that charged for the same oxygen when purchased for commercial purposes. They also agreed to maintain proper ethical practices in the rental of equipment so that the same rental charge will be made whether the bill is paid by the patient directly or by the physician.

The success of the exhibit called attention to the possibility of using the exhibition room of the Academy for similar demonstrations designed to acquaint physicians with new types of therapeutic equipment and with the technique of newer forms of therapy.



THE FIFTH ANNUAL  
ART EXHIBIT  
EXHIBITION OF WORKS  
IN THE PLASTIC AND GRAPHIC ARTS  
BY AMERICAN PHYSICIANS UNDER THE AUSPICES OF THE  
NEW YORK PHYSICIANS ART CLUB  
WAS HELD AT  
THE NEW YORK ACADEMY OF MEDICINE  
FEBRUARY 14 TO MARCH 14, 1931

# LIBRARY NOTES

## RECENT ACCESSIONS

- Ackermann, F. *Dentures et dentiers complets.*  
Paris, Massou, 1930, 538 p.
- Arcand, A. *Les protéines des humeurs.*  
Paris, Le François, 1930, 143 p.
- Bardswell, N. D. *Work centres for the tuberculous.*  
London, Bale, 1930, 64 p.
- Berg, R. *Kontrolle des Mineralstoffwechsels.*  
Leipzig, Hirzel, 1930, 87 p.
- Bing, R. *Kompéndium der topischen Gehirn- und Rückenmarksdiagnostik.*  
8. Aufl.  
Berlin, Urban, 1930, 259 p.
- Box, H. K. *Necrotic gingivitis.*  
Toronto, Univ. of Toronto Pr., 1930, 63 p.
- Boyd, W. *The pathology of internal diseases.*  
Phil., Lea, 1931, 888 p.
- Broom, R. *The origin of the human skeleton.*  
London, Witherby, [1930], 164 p.
- Bryan, C. P. *The papyrus Ebers.*  
London, Bles, [1930], 167 p.
- Burwinkel, O. *Krankheiten des Herzens und der Gefässe.* 2. Aufl.  
München, Gmelin, 1930, 154 p.
- Bury, J. S. *Concerning old age.* [3. ed].  
Manchester, Sherratt, 1930, 32 p.
- Cantarow, A. *Calcium metabolism and calcium therapy.*  
Phil., Lea, 1931, 215 p.
- Cocral, V. *Étude scientifique. La fonction visuelle; la réhabilitation des borgnes.* 2. éd.  
Saint-Amand, Bédu, 1930, 213 p.
- Crabb, E. D. *Principles of functional anatomy of the rabbit.*  
Phil., Blakiston, [1931], 137 p.
- Crossen, H. S. & Crossen, R. J. *Operative gynecology.* 4. ed.  
St. Louis, Mosby, 1930, 1078 p.
- Da Costa, J. C. *Modern surgery, general and operative.* 10. ed.  
Phil., Saunders, 1931, 1404 p.
- Deichgräber, K. *Die griechische Empirikerschule.*  
Berlin, Weidman, 1930, 398 p.
- Delort, M. *Intestins.*  
Paris, Doin, 1930, 537 p.
- Dodds, L. V. *Modern sunlight.*  
London, Murray, [1930], 322 p.
- von Esmarch, E. *Hygienisches Taschenbuch.* 5. Aufl.  
Berlin, Springer, 1930, 452 p.

- Ewing, (Mrs.) I. R. Lipreading.  
[Manchester], Manchester Univ. Pr., 1930, 74 p.
- Eyre, J. W. H. Bacteriological technique. 3. ed.  
London, Baillière, 1930, 619 p.
- Fargin-Fayolle, P. & Thibault, R. La septicité bucco-dentaire.  
Paris, Doin, 1930, 120 p.
- Fenton, W. J. & Burrell, L. S. T. Diseases of the chest.  
London, Cape, [1930], 384 p.
- Ferguson, J. History of the Ontario Medical Association, 1880-1930.  
Toronto, Murray, 1930, 142 p.
- Fosseyeux, M. Il y a cent ans; Paris médical en 1830.  
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- Friedrichsen, F. Die Zuckerkrankheit; ihr Wesen und ihre Behandlung.  
1-3. Aufl.  
Bad Neuenahr, Strehlitz, 1930, 211 p.
- Fulton, J. F., jr. Physiology.  
N. Y., Hoeber, 1931 [1930], 141 p.
- Groves, E. W. H. & Fortescue-Brickdale, J. M. Text-book for nurses;  
anatomy, physiology, surgery and medicine. 4. ed.  
London, Milford, 1930, 641 p.
- Halbwachs, M. Les causes du suicide.  
Paris, Alcan, 1930, 520 p.
- Handbuch der ärztlichen Begutachtung, hrsg. von H. Liniger; R. Weichbrodt; A. W. Fischer.  
Leipzig, Barth, 1931 [1930], 2 v.
- Handbuch der Pharmakognosie, hrsg. von A. Tschirch. 2. Aufl.  
Leipzig, Tauchnitz, 1930, v. 1.
- Handwörterbuch der psychischen Hygiene und der psychiatrischen Fürsorge.  
Berlin, de Gruyter, 1931 [1930], 400 p.
- Hill, (Sir) L. Philosophy of a biologist.  
London, Arnold, 1930, 88 p.
- Imms, A. D. Recent advances in entomology.  
Phil., Blackiston, 1931, 374 p.
- Ischlonsky, N. E. Neuropsychie und Hirnrinde.  
Berlin, Urban, 1930, v. 1-2.
- Joltrain, E. Les urticaires; crises hémoclasiques.  
Paris, Doin, 1930, 417 p.
- Junk, V. Die Nobelpreisträger; dreissig Jahre Nobelstiftung.  
Wien, Winkler, 1930, 303 p.
- Kafka, V. Die Zerebrospinalflüssigkeit.  
Leipzig, Deuticke, 1930, 400 p.
- Kaplan, I. I. Practical radiation therapy.  
Phil., Saunders, 1931, 354 p.
- Kaup, I. & Fürst, T. Körperverfassung und Leistungskraft Jugendlicher.  
München, Oldenbourg, 1930, 310 p.

- Klare, K. Konstitution und Lungeninfiltrierungen.  
Stuttgart, Enke, 1930, 104 p.
- Laboratoriumstechnik und Röntgenverfahren.  
Leipzig, Thieme, 1930, v. 1.
- Lambert, A. E. Guide to study of histology and microscopic anatomy.  
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- Leitch, J. N. Dietetics in warm climates.  
[London], Harrison, 1930, 486 p.
- Leprince, A. La réflexothérapie scientifique endo-nasale et la méthode d'Asuero.  
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- Leriche, R. & Policard, P. Physiologie pathologique chirurgicale.  
Paris, Masson, 1930, 212 p.
- Lloyd-Williams, A. L. The doctor's job.  
London, Student Christian Movement Pr., [1930], 72 p.
- Lynch, K. M. Protozoan parasitism of the alimentary tract.  
N. Y., Macmillan, 1930, 258 p.
- Marfan, B. J. A. Les affections des voies digestives et les états de dénutrition dans la première enfance. 2. éd.  
Paris, Masson, 1930, 735 p.
- Matti, H. Die Knochenbrüche und ihre Behandlung. 2. Aufl.  
Berlin, Springer, 1931 [1930], 938 p.
- Medical history of Michigan.  
Minneapolis, Bruce, 1930, v. 2.
- Merkler, M. E. Dependable dentistry.  
[Long Island City, Dennison, 1930], 114 p.
- Mestrezat, W. Techniques courantes de chimie clinique.  
Paris, Masson, 1930, 263 p.
- Mohs, E. L. Principles of home nursing. 3. ed.  
Phil., Saunders, 1931, 303 p.
- Moorhead, J. J. Traumatotherapy; the treatment of the injured.  
Phil., Saunders, 1931, 574 p.
- Morgan, C. L. The animal mind.  
London, Arnold, 1930, 275 p.
- Mrowka, F. Die filtrierbaren Krankheitserreger und Neues zum Tuberkuloseproblem.  
Leipzig, Barth, 1931, 208 p.
- Orton, J. L. The cure of stammering, stuttering, and other functional speech disorders.  
London, Thorsons, [1930], 92 p.
- Pascal, G. Clinique et thérapeutique chirurgicales.  
Paris, Doin, 1930, 290 p.
- Paul, G. P. Nursing in the acute infectious fevers. 5. ed.  
Phil., Saunders, 1930, 295 p.
- Pink, C. V. The ideal management of pregnancy.  
London, Cassell, [1930], 191 p.

- Plattard, J. *The life of François Rabelais.*  
London, Routledge, 1930, 308 p.
- Potter, S. O. L. *Therapeutics, materia medica and pharmacy.* 15. ed.  
Phil., Blakiston, [1931], 997 p.
- Poynton, F. J. & Schlesinger, B. *Recent advances in the study of rheumatism.*  
Phil., Blakiston, 1931 [1930], 313 p.
- Roussy, G.; Bertrand, I. G.; Grandeclaude, C. [et al]. *Travaux pratiques d'anatomie pathologique.* 4. éd.  
Paris, Masson, 1930, 314 p.
- Sainéan, L. *L'influence et la réputation de Rabelais.*  
Paris, Gamber, 1930, 322 p.
- Schneider, G. *Handbuch der Bibliographie.* 4. Aufl.  
Leipzig, Hiersemaun, 1930, 674 p.
- Segond, J. L. P. *Le problème du génie.*  
Paris, Flammarion, 1930, 283 p.
- Siebert, C. & Wreszynski, E. *Operationslose Krampfadern-Behandlung durch künstliche Verödung.* 2. Aufl.  
Berlin, Urban, 1930, 93 p.
- Simon, C. *Lettres à un médecin praticien sur la dermatologie et la vénéréologie.*  
Paris, Masson, 1930, 285 p.
- Stewart, F. T. & Lee, W. E. *A manual of surgery.* 6. ed.  
Phil., Blakiston, [1931], 1307 p.
- Stimson, P. M. *A manual of the common contagious diseases.*  
Phil., Lea, 1931, 351 p.
- Sym, W. G. *Diseases and injuries of the eye.* 3. ed.  
London, Black, 1930, 493 p.
- Traité d'éducation physique, publié sous la direction de M. Labbé.*  
Paris, Doin, 1930, 2 v.
- Treves, (Sir) F. *The student's handbook of surgical operations.* 5. ed.  
London, Cassell, 1930, 535 p.
- Vogt, A. *Lehrbuch und Atlas der Spaltlampenmikroskopie des lebenden Auges.*  
Berlin, Springer, 1930, v. 1.
- Walton, A. J. *A text-book of the surgical dyspepsias.* 2. ed.  
London, Arnold, 1930, 720 p.
- Weatherwax, J. L. *Physics of radiology.*  
N. Y., Hoeber, 1931, 240 p.
- Winton, F. R. & Bayliss, L. E. *Human physiology.*  
London, Churchill, 1930, 583 p.
- Wyatt, H. T. *Sterilization.*  
[Madison, Wis., Scanlon-Morris], 1930, 104 p.
- Zunz, E. *Éléments de pharmacodynamie générale.*  
Paris, Masson, 1930, 488 p.

## REQUEST FOR MINUTES

The Committee on Library would be very pleased to receive as gifts or, failing that, on deposit for safe keeping, the past minutes of any medical society or medical club. Time and again we have found that such minutes have been of great help in looking up the history of a particular man or branch of medicine. We all recognize that with the change of secretaries minute books are often lost. We have volumes of such material here already, some received as donations and others merely deposited as loans.

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# PROCEEDINGS OF ACADEMY MEETINGS FEBRUARY

## STATED MEETINGS

Thursday Evening, February 5, at 8:30 o'clock

*Program presented in coöperation with the*

Section of Obstetrics and Gynecology

### ORDER

- I. EXECUTIVE SESSION  
Election of Fellows
- II. PAPER OF THE EVENING  
Endocrine diseases: their diagnosis and therapy, Robert T. Frank  
Discussion opened by, Charles C. Lieb, Charles R. Stockard  
Thursday Evening, February 19, at 8:30 o'clock

### THE FIFTH HARVEY LECTURE

"POSSIBLE IMMUNOLOGICAL REACTIONS WITH PLANTS"

E. M. EAST

Harvard University, Cambridge

ALFRED E. COHN, President Harvey Society

DAYTON J. EDWARDS, Secretary Harvey Society

### SECTION OF DERMATOLOGY AND SYPHILOLOGY

Tuesday Evening, February 3, at 8:30 o'clock

### ORDER

- I. READING OF THE MINUTES
- II. PRESENTATION OF CASES
  - a. Cases from Vanderbilt Clinic
  - b. Miscellaneous cases
- III. GENERAL DISCUSSION
- IV. EXECUTIVE SESSION

### SECTION OF SURGERY

Friday Evening, February 6, at 8:30 o'clock

### ORDER

- I. READING OF THE MINUTES
- II. PRESENTATION OF CASES
  - a. Resection for volvulus of a sigmoid megacolon, Carnes Weeks
  - b. Resection of right colon for idiopathic hypertrophic colitis, Edward J. Donovan
- III. SYMPOSIUM ON HEMORRHOIDS
  - a. Medical aspect, John L. Kantor
  - b. Surgical treatment, Jerome M. Lynch
  - c. Injection treatment, Frank C. Yeomans
  - d. High frequency current treatment, William Bierman (by invitation)

IV. GENERAL DISCUSSION

SECTION OF NEUROLOGY AND PSYCHIATRY  
Tuesday Evening, February 10, at 8:30 o'clock

ORDER

- I. READING OF THE MINUTES
- II. CLINICAL PRESENTATIONS  
From the neuro-endocrine service of the Neurological Institute and Vanderbilt Clinic
  - a. The Laurence-Brindle-Moon Syndrome, John McD. McKinney
  - b. Hyperglycaemia in hypopituitarism, with glandular treatment, Josephine H. Kenyon (by invitation)
  - c. Pluriglandular compensatory syndrome, Walter Timme
- III. PAPERS OF THE EVENING
  - a. Disorders induced by injuries to the pituitary and hypothalamus, Philip E. Smith, Ph.D., Columbia University (by invitation)
  - b. The hormonal cause of premenstrual tension, Robert T. FrankDiscussion, Charles R. Stockard, Walter Timme
- IV. GENERAL DISCUSSION
- V. EXECUTIVE SESSION

SECTION OF PEDIATRICS  
Wednesday Evening, February 11, at 8:30 o'clock

ORDER

- I. PAPERS OF THE EVENING  
Dental Nutrition
  - a. Dental physiology, Charles F. Bodecker
  - b. The influence of vitamins upon dental nutrition, Percy Howe, (by invitation)
  - c. Calcium and phosphorus as factors in development, Henry C. Sherman (by invitation)Discussion, Alfred Walker (by invitation), Oscar M. Schloss

SECTION OF OTOTOLOGY  
Friday Evening, February 13, at 8:30 o'clock

ORDER

- I. READING OF THE MINUTES
- II. PRESENTATION OF CASES
- III. REPORT OF CASES from the Ear Clinics of Drs. Arthur B. Duel, John B. Rae, John R. Page and E. Prince Fowler of the Manhattan Eye, Ear & Throat Hospital.  
Introductory remarks, Arthur B. Duel
  - a. Simple mastoidectomy complicating cervical Pott's Disease, Arthur F. Warren (by invitation)
  - b. Secondary mastoidectomy complicated by an apparent parotid abscess, J. S. Manning, Jr. (by invitation)
  - c. End results in 20 cases of primary skin grafts in radical mastoidectomies, Daniel S. Cunningham (by invitation)



- d. Sinus thrombosis complicating chronic mastoiditis, Wright Mac-Millan (by invitation)
- e. 1. Secondary simple mastoidectomy with choked discs and severe cerebral symptoms
2. Temporosphenoïdal lobe abscess complicating chronic otitis media purulenta, Henry M. Scheer
- f. Acute mastoiditis followed by cerebellar abscess, operation and recovery, H. Clifton Luke
- g. 1. Hernia following sinus and jugular operation
2. Double mastoidectomy complicated by retropharyngeal abscess, bilateral sinus thrombosis and necrosis of labyrinth on one side, Charles W. Byrd
- h. Acute labyrinthitis, Lester Mead Hubby
- i. 1. Post-operative radium treatment in carcinoma of mastoid and middle ear
2. Primary radium treatment in carcinoma of external ear, G. Allen Robinson
- j. Report of a case of cerebellar abscess which followed an operation for mastoidectomy, sinus thrombosis and jugular resection on opposite side, John R. Page
- k. 1. Malignant angiomatic polyp with sequestrum of mastoid tip (Avellus-Jackson Syndrome)
2. Deformity of ear and face from lupus erythematosus, treated by tuberculin, E. Prince Fowler (by invitation)

Case discussed by Howard Fox, Charles W. Williams

Discussion, Arthur B. Ducl, John B. Rae, John R. Page, E. Prince Fowler (by invitation)

#### SECTION OF OPHTHALMOLOGY

Monday Evening, February 16, at 8:30 o'clock

#### ORDER

- I. READING OF THE MINUTES
- II. PRESENTATION OF CASES
  - a. A case of tubercular keratitis-fistula of the cornea; repair, Ben Witt Key
  - b. Angioma venenosum of the orbit, Joseph Stanton Hory
  - c. A case of traumatic pulsating exophthalmos (post-operative), Martin Cohen
  - d. A cyst of the iris, A. E. Town (by invitation)
- III. DEMONSTRATION
 

A new method for studying the normal and pathological surface anatomy of the eye, Mark J. Schoenberg
- IV. PAPERS OF THE EVENING
  - a. Proptosis as a diagnostic problem (lantern slides), Ralph I. Lloyd
  - b. The circulation of the aqueous, Jonas S. Friedenwald, Baltimore (by invitation)
- V. GENERAL DISCUSSION
- VI. EXECUTIVE SESSION

SECTION OF MEDICINE

Tuesday Evening, February 17, at 8:30 o'clock

A purely clinical program has been arranged for this meeting, at which cases of unusual clinical interest will be presented and discussed.

ORDER

I. PRESENTATION OF CASES

- a. Splenomegalic polycythemia, complicated by amebiasis, Louis F. Bishop, Jr. (by invitation)
- b. Polycythemia vera, three cases, Joseph E. Connery
- c. Polycythemia vera due to chronic carbon monoxide poisoning, George Baehr
- d. The therapeutic use of oxygen over a period of six months in a patient with pulmonary fibrosis in cardiac insufficiency, Alvan L. Barach
- e. A case for diagnosis, Joseph Hajck
- f. Enterogenous cyanosis, Franklin Hanger (by invitation)
- g. Heart block in a young man without symptoms, Edwin T. Hauser
- h. A case of general lymphadenopathy for diagnosis, Harry A. Solomon

II. DISCUSSION

Knut H. Houck (by invitation), W. W. Palmer, Dickinson W. Richards, Jr. (by invitation), Emanuel Libman, H. S. Patterson, Nellis B. Foster, Harlow Brooks, Lewis A. Conner, John Wyckoff

SECTION OF GENITO-URINARY SURGERY

Wednesday Evening, February 18, at 8:30 o'clock

ORDER

I. READING OF THE MINUTES

II. PAPER OF THE EVENING

Certain congenital malformations of the genito-urinary tract: their diagnosis and treatment, Hugh H. Young, Johns Hopkins Medical School (by invitation)

Discussion, Benjamin S. Barringer, Henry G. Bugbee, Oswald S. Lowsley, A. T. Osgood, Nathaniel Rathbun, J. Sturdivant Read, A. R. Stevens, J. J. Valentine

III. GENERAL DISCUSSION

IV. EXECUTIVE SESSION

SECTION OF ORTHOPEDIC SURGERY

Friday Evening, February 20, at 8:30 o'clock

ORDER

I. READING OF THE MINUTES

II. PAPERS OF THE EVENING

- a. The treatment of acute gonorrheal arthritis by the injection of air, William B. Porter (by invitation)
- b. The treatment of severe injuries to the ligaments of the knee joint, H. Page Mauck (by invitation)

III. GENERAL DISCUSSION

SECTION OF OBSTETRICS AND GYNECOLOGY  
Tuesday Evening, February 24, at 8:30 o'clock

ORDER

- I. READING OF THE MINUTES
- II. PRESENTATION OF CASES
  - a. Ovarian pregnancy—case report, Anthony Wollner (by invitation), Alfred Hellmann
  - b. Stricture of the female urethra—case reports, Salvatore di Palma, H. D. Furniss, L. M. Kahn
  - c. Report of a case of uretero-vaginal and vesico-vaginal fistula successfully repaired in 1920, H. Dawson Furniss
- III. PAPER OF THE EVENING  
The elective classical caesarian section as a preventative of obstetric morbidity, Edward A. Schumann, Philadelphia (by invitation)  
Discussion, George L. Brodhead, George W. Kosmak, Hervey C. Williamson, H. B. Mathews, Edward C. Lyon, Jr., Frederick Holden, Prof. Graff of Vienna
- IV. GENERAL DISCUSSION
- V. EXECUTIVE SESSION

SECTION OF LARYNGOLOGY AND RHINOLOGY

In Conjunction with

THE NEW YORK GASTROENTEROLOGICAL ASSOCIATION  
Wednesday Evening, February 25, at 8:15 o'clock

ORDER

- I. PAPERS OF THE EVENING  
SYMPOSIUM ON "THE ESOPHAGUS"
  - a. Diverticula, Frank H. Lahey, Boston (by invitation)
  - b. Strictures, Gabriel Tucker, Philadelphia (by invitation)
  - c. Cardiospasm, Charles J. Imperatori
- II. DISCUSSION  
John E. Mackenty, Armistead C. Crump, Mervin C. Myerson

NEW YORK ROENTGEN SOCIETY

In Affiliation with

THE NEW YORK ACADEMY OF MEDICINE

The regular February meeting was not held on February 16 for the reason that the Society held a two day conference in Baltimore on February 6 and 7, arranged by the Baltimore Roentgen Society.

ROSS GOLDEN, President

J. BENNETT EDWARDS, Secretary

SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE

Under the auspices of

THE NEW YORK ACADEMY OF MEDICINE

Wednesday, February 18, at 8:15 o'clock

- I. On the Cortical Hormone of the Adrenal Gland, W. W. Swingle and J. J. Piffner
- II. A Precipitant for Material in Liver Active in Pernicious Anemia, R. West, M. Howe, and H. D. Dakin

- III. Specificity of Reactions Produced by Injection of Urine from Pregnant Cows upon Immature Female Guinea Pigs, G. N. Papanicolaou
  - IV. Study of the Virus of the Common Cold and its Cultivation in Tissue Medium, A. R. Dochez, K. C. Mills and Y. Kneeland, Jr.
  - V. Relationship of Sera and Spinal Fluids to Agglutination and Flocculation by Dyes, L. Rosenthal and O. S. Hornick
  - VI. Demonstration of a Tumor Inhibiting Substance in Filtrate of Rous Chicken Sarcoma, and in Normal Chicken Sera, M. J. Sittenfield, B. A. Johnson and J. W. Jobling
  - VII. The Gastric Hunger Mechanism. II. The Effect of Diet, M. G. Mulinos
  - VIII. Further Note on the Enumeration of Blood Platelets and Red Blood Cells, A. E. Casey (introduced by L. Pearce)
  - IX. Delayed Differential Counting of the White Blood Cells by a Modified Supravital Technique, A. E. Casey and P. D. Rosahn (introduced by L. Pearce)
- PEYTON ROUS, *President* A. J. GOLDFORB, *Secretary*

## NEW YORK PATHOLOGICAL SOCIETY

In Affiliation with

THE NEW YORK ACADEMY OF MEDICINE

Thursday Evening, February 26, at 8:30 o'clock

## ORDER

- I. PAPERS OF THE EVENING
    - a. Congenital esophageal stenosis due to aberrant ductus arteriosus, Henry Rascoff, Mendel Jacobi
    - b. Spongioneuroblastoma; a tumor formation associated with tuberous sclerosis, J. H. Globus (by invitation), H. Selinsky
    - c. The occurrence of malignancy in radio-active persons, Harrison S. Martland
    - d. Serum and plasma bilirubin: a comparative study of 100 cases, Rubin Finkelstein, Mendel Jacobi
  - II. READING OF THE MINUTES
-

## FELLOWS ELECTED MARCH 5, 1931

Alan R. Anderson .....	237 East 20th Street
Renfrew Bradner .....	6 East 85th Street
George A. Cashman .....	65 East 66th Street
Augustus Harris .....	306 Park Place, Brooklyn
Maurice Lenz .....	1049 Park Avenue
J. Arnot MacGregor .....	121 East 60th Street
Beryl Holmes Paige .....	622 West 168th Street
Frank H. Peters .....	400 East 58th Street
Herman Selinsky .....	345 West 86th Street
Barbara B. Stimson .....	25 Claremont Avenue
Marjorie Lord Strauss .....	108 East 91st Street

## DEATHS OF FELLOWS OF THE ACADEMY

CHARLES BENNET BRODER, M.D., 240 East 15 Street, New York City; graduated in medicine from Cornell University Medical College, New York City, in 1905; elected a Fellow of the Academy February 5, 1914; died, February 15, 1931. Dr. Broder was a Fellow of the American Medical Association, a member of the County and State Medical Societies and Laryngologist and Otologist to People's Hospital.

## DEATH OF MR. JOHN S. BROWNE

### RESOLUTIONS PASSED AT THE STATED MEETING OF THE ACADEMY HELD MARCH 5, 1931

Mr. John S. Browne consulting librarian of the Academy, died at his home in New Jersey on Friday, February 27, 1931 at the age of 76.

Mr. Browne became librarian and general superintendent in 1880 and served the Academy in that capacity continually until 1925. Throughout this period of 46 years the history of the Academy was intimately identified with the life experience of Mr. Browne.

"Under the zealous efforts of Mr. Browne, the Library increased rapidly in volume and in importance. Soon after the date of his appointment, Dr. John S. Billings was made Librarian of the Library of the Surgeon General's office in Washington, and thus at once Mr. Browne

found himself confronted by a powerful rival, as shown in the competition between them for desirable accessions. In these competitions Mr. Browne often outbid his rival funds being provided by enthusiastic members or by their generous friends.

"The growth of its Library, according to the record, eloquently proves the esteem in which it was held. The total books in 1875 amounted to 21,720; in 1880 to 25,000; in 1900 to 49,830, and in 1910 to 80,790. In 1926 there were 139,320 books, 98,685 pamphlets, while 1,500 were journals subscribed for, making a total of 239,505 titles.

"If the fame accorded to Dr. Billings for the upbuilding of the second greatest medical library in the world is justly deserved, then equal credit is due to our own Librarian for the success of his life work in creating the Library of the Academy as it stands today, the third greatest of its kind."

RESOLVED that the Academy hereby records its deep sense of loss in the death of Mr. John S. Browne, consulting librarian of this Institution to which he devoted a lifetime of service, and be it further

RESOLVED that a copy of this minute and resolution be published in the Bulletin of the Academy and sent to the members of his family.

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and

The Chairman of each Section

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FRANKWOOD E. WILLIAMS

# BULLETIN OF THE NEW YORK ACADEMY OF MEDICINE

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## ANNUAL GRADUATE FORTNIGHT

### PUERPERAL MORTALITY AND ITS REDUCTION\*

GEORGE W. KOSMAK

*President, Medical Society of the County of New York*

A world-wide interest has been developed in recent years in the mortality due to childbearing. The acceptance of a certain number of maternal deaths as unavoidable risks which are associated with pregnancy and labor has been universal for so many years that it was difficult until a comparatively short time ago to develop any interest in the subject among the laity, or even in medical circles. This point of view has undergone a change and the public has asked and the profession has been asked very bluntly why this should be so, and more particularly we are asked whether anything can be done to prevent this high death rate. For experience has shown that it is definitely possible that a certain proportion of deaths from childbirth can be prevented. In fact, this development in our knowledge has gone so far that we can actually separate the causes of puerperal deaths into those which are preventable and those which are unavoidable.

In the latter group would come certain unfortunate complications of pregnancy characterized by hemorrhage and similar factors, and in that former larger group we may place toxemia and infection. It is to the infections asso-

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\*Introductory remarks to a symposium on Puerperal Infections, October 27, 1930. Program arranged under the auspices of the Medical Society of the County of New York.



ciated with childbearing that we give special attention in this program and well may this subject be included in the general topic to which the Graduate Fortnight is devoted. Its importance from a medical as well as a social and economic point of view is stupendous. Puerperal sepsis, that particular complication of pregnancy to be discussed this evening takes a toll of over one-third of the mothers who have sacrificed their lives to childbearing.

It would seem that sepsis could be prevented in obstetric practice as it is elsewhere in medicine. As a matter of fact it has to a large degree, but as we are still ignorant of all the modes by which it develops, the millenium is not at hand in so far as its complete abolition is concerned. But we must continue our efforts to attack the problem, even if this requires a revision of the means by which we have thus far studied it. It appears to me that the methods of prevention generally employed are too much limited to local conditions and not sufficiently extended to the patient and her organism as a whole. We have directed our attention largely to the maintenance of an aseptic labor, realizing fully, however, that even where this is properly conducted, there are numerous avenues of infection which cannot be completely controlled. In this we have side-tracked as it were the maintenance of the natural resisting powers of the patient and it might be well, although this seems far-reaching, to regard with careful thought the lessons of immunization which have been taught by the pediatricist, the internist and others. This is a field which has been largely neglected, for we have been so busy with our local efforts of preventing the introduction of organisms into the body that we have forgotten how great a factor the natural immunity of the woman is under such circumstances. Were it not for this immunity a much larger number of women would succumb. For we are gradually finding out that the pregnant woman develops a protective organism in her pelvis and in her blood-stream, the maintenance of which we must aim to develop and to make use of in our fight against puerperal sepsis. This, I believe, to be one of the leading factors in future efforts to reduce septic

infection as the result of childbearing. In the meanwhile it is important that we persist in our use of the knowledge already at hand and that every effort be made to avoid the introduction into the generative tract of any pyogenic organisms which may later possibly invade the tissues themselves. As a matter of practice this should be the principal aim because here we are treading on more or less known ground, for it has been amply proven that a delivery conducted under natural and cleanly circumstances is less apt to spell disaster from the standpoint of infection than one which is carelessly or ignorantly carried out. A tendency to interfere with the natural course of labor by various operative and other procedures is undoubtedly one of the most serious accusations which the profession will have to face. It will be difficult to curb this tendency, for on the one hand there is the demand by the patient for a shortening of her labor, stimulated as it has been by widely circulated magazine articles and other propaganda, to which desire for relief the physician is only too ready to accede, perhaps for reasons of his own. And then on the other hand is that increase in technical knowledge about obstetric deliveries which is so valuable in the hands of the highly trained specialist and so dangerous if practised by his less competent colleague. And how may the unfortunate result of these circumstances be combatted? I believe very firmly that it is only by the proper education of our medical students, by giving them a well balanced general education in medicine, rather than a smattering of the various specialties, that they will possess a thorough knowledge of the physiologic processes of labor, and above all, a recognition of any deviations from the normal.

The high death rate associated with childbirth in the United States has been made the subject of very extensive comment, much of it of a most uncomplimentary nature. The comparisons drawn between this and foreign countries are most unpleasant and the United States has been almost labelled as a pariah among the nations of the world in so far as its care of the pregnant woman is concerned. This agitation for improvement has undoubtedly resulted in

some good, although the attempt to introduce federal and other legislation as a solution of the problem has not met with success, as was to be expected. I cannot refrain, however, from calling attention to the fact that in the European countries with which our statistics have been compared there is also an admitted lack of satisfaction with conditions as they are. This has become increasingly evident in recent years and notwithstanding the insurance schemes, supervised midwife practice and other factors, dissatisfaction seems to be rife. The objections, among other things, have been directed to the education of medical men in so far as over-crowding the student courses with theoretical rather than practical subjects. In obstetrics particularly the objection has been brought forward that the attempt is made to train students in operative procedures rather than the conduct of normal deliveries. In fact the objection to interference with the normal processes of labor is brought out just as strenuously in obstetric circles abroad as it is in this country. Moreover the acceptance of the health insurance system has contributed to the problem, for many obstetric operations are now being done which would have been considered unnecessary had there not been present the stimulus of an increased fee from the insurance fund, which would not have applied in a normal delivery.

Admitting the fact that childbearing in the United States is not as safe as it ought to be, what is the remedy, particularly as to those causes which may be included in the preventable group of which sepsis is most important? The question is not an easy one to answer. There is more than one factor to be solved. The natural history of puerperal infection is well understood in its larger aspects but much remains to be done. We do know, however, the danger of interfering with the natural processes of labor and of not giving sufficient time for their accomplishment. This may mean an entire revision of our conception of obstetric practice, in which the introduction of a supervised midwife system may possibly have to be considered, much as this may offend, in addition to a radical change in teach-

ing medical students and physicians. And this reform must be extended to the mass of the profession and much may be accomplished, I believe, by such measures as The New York Academy of Medicine has developed in this Graduate Fortnight.

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# CLINICAL AND PATHOLOGICAL NOTES ON PUERPERAL INFECTION \* (A LANTERN DEMONSTRATION)

J. WHITRIDGE WILLIAMS

Professor of Obstetrics, Johns Hopkins University

I shall talk to you very simply tonight, and the bulk of my talk will consist in the demonstration of a number of lantern slides which illustrate certain factors and phases in puerperal infection. After I finish the demonstration, I shall say a few words concerning puerperal infection in general, when Dr. Polak will probably dwell upon certain points which I have omitted.

(Demonstration) This slide represents a section through the uterus of a woman who died from hemolytic streptococcus infection following a criminal abortion. The reason I show it to you is to demonstrate that the lesions in the interior of the uterus are extraordinarily slight. Here you see the muscle and here the thin decidua. The latter is perfectly smooth, so that it is apparent that nothing could have been scraped away by a curette; so that the only effect of such a procedure would have been to spread the infection.

(Demonstration) Here is a section from the uterus of a woman who died from beta hemolytic streptococcus infection following fullterm labor. Death occurred from general peritonitis nine days after delivery. Here again you see that the lining of the uterus is very little thickened, and all that is visible under the low power is a narrow zone of leucocytic infiltration; and yet from this little area of infection streptococci made their way through the lym-

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\*Delivered October 27, 1930. Program arranged under the auspices of the Medical Society of the County of New York.

phatics and uterine wall and gave rise to the general peritonitis which caused death.

(Demonstration) This represents a section from the same uterus, much more highly magnified; and here you see that the zone of leucocytic infiltration is made up of a number of layers of polymorphonuclear leucocytes. Toward the uterine cavity is a thin layer of necrotic tissue containing streptococci. The protective leucocytic wall was not sufficient to prevent their invasion, and they passed through the uterine wall, giving rise to the peritonitis from which the patient died. I think that it is extraordinarily important to consider this slide carefully and to realize how slight the local lesion may be in certain fatal cases.

(Demonstration) Here is a section from the uterus of another woman who died following a criminal abortion. This section represents the interior of the uterus, the upper part representing the decidua and the lower, uterine muscle. You will note that the entire decidua is infiltrated with leucocytes, and these can be traced as strands of cells through the entire muscularis. In this instance, the process extended through the entire thickness of the uterine wall and gave rise to the general peritonitis.

(Demonstration) This section represents the muscular wall of the uterus of the same patient. Note the muscle fibres and the veins and the spaces between them, and you will see that the spaces which represent the lymphatics are filled with round cells and leucocytes. In properly stained sections these can be traced from the interior of the uterus to the peritoneum and show chains of streptococci making their way to the peritoneum, where they gave rise to the fatal peritonitis from which the patient died.

(Demonstration) Here is a section of a great deal of interest because it gives us a clue as to how an infectious process is transmitted from the uterine cavity to the peritoneum. This section shows the interstitial portion of the fallopian tube just after leaving the uterine cavity, and you will notice that it is perfectly normal, shows no signs

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of inflammation, and there is nothing about it to indicate that the peritoneal infection had resulted from the transmission of infectious material to the peritoneal cavity by means of the tube. On the other hand, if we go back to the specimen which I just showed you, it is clear that the infection had traversed the uterine muscles and reached the peritoneum by way of the lymphatics. Too much stress cannot be laid upon this point. The great majority of writers will tell you that in many cases the infection is conveyed from the uterus to the peritoneum by means of the tubes; yet in the many autopsies which I have seen upon women dead from puerperal infection, I have never seen one in which there was any evidence that infection had occurred in this manner.

(Demonstration) This section which was obtained from a woman dying from puerperal peritonitis shows that while the tube offers signs of inflammation, it has not been the means by which the infection had transmitted. In this case, the interior of the folds of the tubal mucosa was filled with leucocytes, round cells and streptococci, and yet the lumen was free from infectious material. In this instance, the involvement of the tube was not the result of direct extension from the uterine cavity, but was due to the extension of the process through the lymphatics; and this again proves the correctness of what I have just said.

(Demonstration) This is a section from the uterine wall of one of the cases we have already demonstrated, and in it we see chains of streptococci which are making their way through the lymphatics and the uterine wall to the peritoneum. I wish to make it perfectly clear that the extension occurred in this way, and not through the lumen of the tube. When you think of the large number of streptococci which are visible, and recall that they only constitute a fraction of those actually present, it becomes clearly apparent that any attempt at intrauterine treatment would have been of no avail.

(Demonstration) I shall now present a section of a

great deal of interest, illustrating a protective mechanism, which develops in the uterine wall, against the occurrence and spread of infection. Several years ago, my associate Hofbauer said to me that he had an idea that there must be some mechanism in the lateral part of the uterine wall and the inner margin of the broad ligaments which played a part in preventing the occurrence of infection and in lessening its spread; for, if this were not the case, serious infections must occur more frequently than they do, when we take into consideration the defective technique employed by so many obstetricians. With this in mind, he studied microscopically all of the pregnant uteri which we had in our museum; and after about a year's work, he felt that he had discovered such a protective mechanism, and pointed out that it consisted in a process of rejuvenation of the connective tissue in those localities in which large numbers of peculiar connective cells were present—clasmatoocytes. He pointed out that in the non-pregnant uterus the connective tissue is much more dense and fibrous; but that under the influence of pregnancy it became much looser in structure and more juvenile in type. Furthermore, that when infection occurred, the number of clasmatoocytes rapidly increased and they could be seen ingesting the offending organisms. He held that this constituted an important protective mechanism which is always present, and that when the infecting organisms are not virulent, it usually suffices to arrest the process; but that when they are virulent it is unequal to the task and extension of the infection occurs. Since then, Stieve has pointed out essentially the same thing. In the section before you, you see isolated muscle cells and between them the loose connective tissue scattered through which are numerous large cells with a small nucleus and vacuolated protoplasm. The latter are the clasmatoocytes which Dr. Hofbauer believes, and I agree with him, play so marked a part in preventing infection in the first place, and in limiting its extension when it occurs.

(Demonstration) As you know, when women die from infection, death may occur in a number of ways. There

are, however, three great groups: first, general peritonitis; second, thrombophlebitis; third, generalized infection or sepsis foudroyant. We have already dealt with the first group, and I have shown you how peritonitis occurs, and when the outcome is to be fatal, death usually occurs within ten days after delivery. On the other hand, in women suffering from thrombophlebitis, symptoms do not occur until the end of the first or the beginning of the second week, and when death occurs, it is not until after the expiration of six or more weeks. In cases of this kind, we find that the process originates at the placental site and spreads outward through the veins, being marked by the development of thrombosis. This process extends beyond the uterus into the veins and the broad ligaments and thence into the common iliac and ovarian veins; and in advanced processes may even involve the vena cava. In my experience, this is the second most common cause of death.

The third cause of death is generalized infection, or sepsis foudroyant. In such cases, the woman is overwhelmed by the access of large numbers of virulent streptococci to her blood stream and these form toxins before local lesions become manifest. At the present time, this constitutes a rare occurrence; but in times past, it was very frequent. At autopsy in such cases, no gross lesions are found; but when cultures are made, we find that the blood stream is loaded with virulent streptococci, and in such cases death often occurs within eighteen to thirty-six hours after delivery.

(Demonstration) The section which I am showing was obtained from a woman dying from the thrombophlebitic type of infection, and inspection shows that the vessels of the uterine wall are filled with thrombi; and it is from the extension of this process that the fatal issue occurs. As I have already told you, death in such cases does not occur until many weeks after delivery and then is the result of pyemic processes in other parts of the body, and here is a section from the uterus of a patient who died ten weeks after the original infection; and yet the endome-

trium is perfectly normal and shows no signs of inflammatory reaction. How do we account for this? Simply that the portal of entry for the infection had undergone resolution; and yet the process beyond the endometrium was sufficient to kill the woman. Here in the section we see a vein in the uterine muscle which is partially filled with thrombi, and it is evident that from it the process had extended outward and given rise to the condition from which the woman died. It is apparent that in this case local treatment would have been without avail, as all that the curette could have removed would have been normal endometrial tissue.

(Demonstration) This section represents another portion from the same uterine wall and shows a vein which is completely thrombosed. In this instance, it would appear that the thrombosis is doing no particular harm and it will continue to be inert until it undergoes liquefaction and its contents pass into the general circulation. I shall come back to this a little later; but in the meantime, bear in mind that in thrombophlebitis, when we see the patient late, all trace of infection may have disappeared from the uterine cavity so that there is nothing there to treat; but out in the wall of the uterus are the thrombosed vessels from which the process may extend.

(Demonstration) Here is another very interesting form of infection. This slide represents the half of a uterus which was obtained under the following circumstances. A colored woman with a markedly scoliorrhachitic pelvis so greatly contracted that the only possible means of delivery was by Cæsarean section, had been in labor in her home for six days after rupture of the membranes, and came into my hands with a high temperature, a rapid pulse and apparently a general peritonitis. The child was dead, but even in spite of that, we did a Cæsarean section and removed the uterus unopened, as the easiest way of coping with the situation, although we did not feel that she had more than one chance in five; and she died the next day from generalized peritonitis which was

present at the time of operation. After hardening in formalin, the uterus was opened and the child removed, when we found that its entire interior had been converted into an abscess cavity. Except at the placental site, the entire interior of the uterus had been denuded of its membranes and decidua, and scattered through it, as shown in the slide, were deep ulcerated areas going down into the muscularis. In other words, the patient had a beta hemolytic intrapartum infection which spread to the peritoneum while the child was still in utero, and I am showing you the specimen to indicate how useless any form of treatment would have been which was undertaken with the idea that it would cure the patient.

(Demonstration) I shall now show several sections from a very interesting case. Several years ago, a patient whose membranes ruptured before she entered the service was admitted with fever. The following day she gave birth to a premature stillborn child, without a vaginal examination. The day after delivery, jaundice appeared and aroused the suspicion that we might have to deal with acute yellow atrophy of the liver. Chemical examination of the blood rather confirmed that opinion. There was a marked increase in the non-protein nitrogen, a definite increase in sugar, and large amounts of leucine and tyrosine in the urine. Death occurred within twenty-four hours, without any attempt at local treatment on our part, and I shall never forget the impression the autopsy made upon me. As soon as the abdomen was opened, it was apparent that she was suffering from a general peritonitis, and a peculiar crackling sound was heard as of a child blowing soap bubbles. On closer observation, it was found that this was due to bubbles oozing out from the surface of the uterus; and to make a long story short, she had a generalized gas bacillus infection, while the clinical diagnosis had been acute yellow atrophy. I am showing you a section of this uterus under an ordinary high power and not under an oil immersion lens, and yet you see myriads of gas bacilli lying between the muscle fibres. The next slide shows this in an even more striking way; and on looking

at it carefully, we find that it presents a honey-comb appearance due to the disassociation of the muscle fibres by gas cysts, and again all through it are numerous gas bacilli.

(Demonstration) The following slide is from a portion from the liver of the same patient, and here you see that the central vein is almost entirely clogged with the same organism; and it is apparent from the study of these sections that nothing that could have been done would have saved the patient's life; and that any attempt at treatment would have only led to self-deception.

(Demonstration) This slide is not a microscopic section, but represents a horizontal section through a three weeks' puerperal uterus. The patient in question had a normal spontaneous delivery followed by mild infection. After ten days or so the temperature course became hectic in character, rising to  $103^{\circ}$ ,  $104^{\circ}$  and  $105^{\circ}$  in the evening and dropping to normal or subnormal in the morning. We examined her repeatedly in the expectation that we might demonstrate thrombosed veins, but we could not do so. In view of the clinical history, as well as of the fact that her uterus was about twice as large as it should be for that stage of the puerperium, I made a tentative diagnosis of multiple abscesses of the uterine wall and opened the abdomen and removed the uterus. Prompt recovery followed. The slide shows that the uterine wall is studded by a number of small abscesses, and closer study shows that they were due to a breaking down of thrombi. Streptococci were found in large numbers. They had not given rise to the peritonitis but merely to the local process which yielded to surgical treatment.

I have shown you these specimens with a definite purpose, and that is, to impress upon you that in severe puerperal infection there is almost nothing you can do; that medication does no good, as far as I know the various serums are useless, and only occasionally, as I shall point out in a moment, is surgical treatment of any avail; and consequently, the best results are obtained by those who

do the least. Indeed, I am fond of saying to my students that in such cases prayer is the best treatment, and the better prayer a doctor is, the better his infected patients do. At the same time, it must be remembered that there is a great number of cases, of which I have shown you a number of examples, that will not recover even under prayer; but it is my experience that in the less serious cases the more radical the treatment the higher the mortality. This is a very important point to get into your minds, and the first uterus I showed you is a good illustration of the fact that had it been curetted, nothing would have been brought away, and all you would have done would have been to stimulate the infection and thus hasten the fatal outcome.

Likewise in the case of the woman with thrombophlebitis, I showed you that the interior of her uterus was lined by normal decidua and that the lesion lay in the thrombosed vessels out in the uterine wall and beyond; and accordingly, nothing that might be done to the interior of the uterus could do good, but might do great harm; and furthermore, it might spoil one's own mental processes, because the worst thing that a doctor can do is to fool himself. Generally speaking, it may not be bad to fool one's patients, because it is sometimes good for them; but as soon as a doctor begins to fool himself, he becomes dangerous to his patients and to the community. Again, I may state that in my experience all the mild cases of puerperal infection do very well provided, as I am fond of expressing it, we do not be-devil the patient. On the other hand, the very severe cases tend to die, and the specimens which I have shown you illustrate that they would have died no matter what was done, and probably death would occur sooner the more energetic the treatment. Consequently, I hold that in treating puerperal infection we are facing a very serious matter, and that the mild cases take good care of themselves, and that the severe cases as a rule die.

Now, if this is the case, where does surgical treatment come in? In my estimation it plays a very restricted part,

but as I shall indicate to you, it sometimes saves life. For example; once in a while when we can make a diagnosis in the early forms of thrombophlebitis, after we open the woman's abdomen and tie off the veins beyond the point of thrombosis, we sometimes effect a surprising cure; and in such cases, the woman, who had been having a hectic temperature suddenly has her temperature return to normal and makes a perfectly satisfactory recovery. This, however, is a relatively rare indication and is in great part due to the fact that our diagnostic means are faulty, for if we operate too early the intervention proves unnecessary, whereas, if we operate too late, interference is generally useless. On this account, I find an indication for such an operation only once in every few years.

The most common surgical intervention which I employ is in cases in which the infection is limited to the broad ligaments; in other words, when we have to deal with so-called parametritis, where a pelvic abscess develops and bulges over Poupart's ligament. In such cases, if we open and drain the abscess extraperitoneally, recovery nearly always ensues. It is probably in this type of case that Hofbauer's defensive mechanism plays an especially important part, and as a result of its activity limits the infection to the broad ligaments and prevents its spread to other parts. Again, as in the case of multiple abscesses of the uterine wall, which I have just demonstrated, we occasionally get an indication for surgical intervention; but in general, such intervention is rarely called for. I shall not, however, labor the point, and Dr. Polak will probably continue the discussion as to the propriety of such intervention.

To recapitulate, I may say that puerperal infection is relatively common, fortunately the great majority are mild cases which take care of themselves if they are not made worse by the ministrations of the physician; while many of the severe cases die no matter what we do. And this reinforces once more the necessity for prophylaxis upon which Dr. Kosmak has laid such stress. I shall not



discuss this question further than to say that it consists in the most meticulous observation of aseptic technique and the consideration of the various factors concerned in the production of immunity.

Dr. Kosmak has brought out a point of a great deal of importance, and that is, that we ordinarily fail to take into consideration as much as we might the individual patient; and I consider this a point of capital importance.

In my clinic, we have a material almost equally divided between whites and blacks, although the latter form only one-sixth of the population of Baltimore. You may ask why the latter have such disproportionate representation, and the answer is that the colored woman in general is in much greater need of hospital care, as in my experience she has a much harder time having her babies than the white woman; and this is due to several factors. In the first place, she has nearly four times as much contracted pelvis as the white woman, and indeed, she does everything obstetrical worse than the white woman except that she appears to have less placenta prævia. Moreover, we find that many more deaths occur in the colored patients, notwithstanding the fact that they are treated in the same clinic, in the same operating rooms, and by the same staff. In general, febrile puerperia are twice as common in them as in the whites, and when severe infection develops, it is much more fatal. For example: in the 11 cases of fatal infection for which my service has been responsible during the last few years, 3 occurred in white and 8 in black women. I cannot tell you why the colored woman is so much more prone to infection and succumbs to it more readily; but this observation may have an important bearing upon the general question of the high maternal mortality in this country, which as you know, is higher than in any other country of the world except New Zealand and Chile. I have no facts to prove it, but I have gotten the impression that the results are not always due to poor obstetrics but may be due to some peculiarity of American women themselves; and this raises the question as to

whether the product of the "melting pot" is as good medically as most persons are inclined to believe it is in other respects. This is a mere supposition, but I am not at all sure that further investigation may not indicate that the mixture of races in this country has brought about a type of woman who stands childbirth less well than the women in other countries where the racial strains are purer. With this in mind, you can see why I appreciate what Dr. Kosmak has said, and how I am hopeful that more extensive observations may bring us eventually to some more definite conclusion.

Thus far, I have talked a good deal as a pessimist and possibly have given the impression that there is nothing we can do for puerperal infection except to prevent it. I am, however, something of an optimist, and this optimism is founded in part upon observations made in my service. At the end of last year, I analyzed the causes of death in 12,000 patients admitted to my service and found that 47 of them had died from infection. This is a large number and at first glance would appear excessive; but when I came to analyze them, I found that we could eliminate a considerable number at least so far as our responsibility was concerned. In the first place, we found that 22 of the 47 women were admitted to the service with general peritonitis following criminal abortion. Nearly all of these were admitted in extremis and all died. We assume no responsibility for them because the condition existed before they came into our hands. Likewise, 7 of the 47 women succumbing were admitted postpartum and were brought to the hospital to die from an infection contracted elsewhere. Furthermore, 6 other women were sent into the service as neglected cases, and when they entered, were already profoundly infected; and cultures made before we undertook any operative intervention showed the presence of beta hemolytic streptococcus. Likewise, we can assume no responsibility for these women, as the infection was firmly established before they came into our hands. After deducting these cases, we have left 11 cases for which we must assume a more or less per-

sonal responsibility; and I want to say a few words about them.

Eleven deaths out of 12,000 admissions is, as I figure it, a little less than  $1/10$  of 1 per cent; in other words, a little less than 1 death per 1,000 from infection among women who came into our hands uninfected. I shall not go into them in detail except to say that in several cases the fault was clearly ours, while in others, the mode of infection was not clear. For example: one woman died after an easy spontaneous labor; she had not been examined vaginally, but when we came to inquire as to how the fatal infection occurred, we found that the man who had delivered her had handled a woman admitted suffering from the results of criminal abortion, and who later died from a hemolytic streptococcus infection. Although no vaginal examination was made, it would appear fair to assume that in this case the infection should be attributed to us. In another instance, the responsibility for the infection was not so clear. In this instance, the patient was admitted to the service with fever and signs of tonsillitis and otitis media before she fell into labor. Twenty-four hours later she had an easy spontaneous labor during which no vaginal examinations were made. There was no perineal tear, yet two hours afterwards her temperature was 104.6 and a blood culture taken at that time showed the presence of hemolytic streptococcus. She died on the eighth day with general peritonitis, and at autopsy the same organism was isolated. I am inclined to believe that in her case the fatal infection was a metastatic one, that it originated from her throat infection and was not due to anything that we did or failed to do. If this supposition is correct, it is apparent that death from similar causes cannot be prevented.

After making all allowances, it would appear that even in a well regulated lying-in hospital a small amount of fatal infection is inevitable, which ordinarily should not exceed 1 case in 1,000. Some of these deaths are unavoidable, as in the case of metastatic infection just mentioned.

while others are due to errors in technique, which might be avoided. At the same time, I do not wish to be understood as belittling the occurrence of infection in lying-in hospitals, as it is only by the utmost attention to the details of technique that we can expect to get and maintain good results; but in the present state of our knowledge we are extraordinarily impotent in the presence of actual infection. Finally, the great majority of infections are mild and do little harm except to increase the length of the patient's stay in the hospital. On the other hand, a certain number are severe, and in those we are able to do very little more than our predecessors, except in a small number of cases in which radical surgical intervention seems indicated.

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# PUERPERAL INFECTIONS AND THEIR PRESENT THERAPY\*

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One would suppose that in this day of scientific medicine and aseptic surgery, infection at childbirth would be a most unusual condition, however, this is not the case, as any perusal of available statistics will show that from 30 to 40 per cent of the maternal death rate from childbirth is credited to infection. This does not, by any means, give a true picture of the incidence of infection and the morbid conditions which result therefrom.

In this discussion I will confine myself to the consideration of the most common pathological lesions which result from the inoculation of puerperal wounds—for in the last analysis, *postpartum infection is but a wound infection* which remains as a primitive lesion or becomes consecutive from wound drainage through the blood stream or lymphatics.

Certain bacterial flora have their habitat in the vagina; these consist of varying strains of aerobic and anaerobic streptococci, staphylococci, the bacillus coli communis, the gas bacillus of Welch and saprophytes which according to Schottmüller are anaerobic streptococci. These bacteria under normal circumstances are held in check by the antibacterial action of the physiological secretions of the vagina and pòrtial cervix—but in dry labor many of these organisms are found in the cervix and lower segment after but six hours of labor. Ordinarily the local tissue reactions are such that in the course of 72 to 96 hours, these

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same bacteria are no longer present; therefore, they do not become of pathogenic interest. This statement is confirmed by the experimental work of Brown and Harris who have demonstrated the same strains of bacteria in the cervix after six hours of dry labor, as those which were found in the vagina prior to onset of labor. This fact stands out in importance when we think that infection is the result of bacterial inoculation of the puerperal wound. The corollary of this is that without a wound we do not have puerperal infection—for all infection is dependent upon a bug, an avenue of entrance and a soil. The simplest lesion is the puerperal ulcer which results from inoculation with invading organisms of a perineal, vaginal or cervical wound. Ordinarily this lesion remains as a primary infection and becomes covered with a dirty greyish membrane under which is a granulating surface secreting pus. The ulcer is surrounded by a protective inflammatory zone which protects the host from the invader. When this lesion is a tear extending into the adjacent cellular tissues, surrounding the vagina or cervix, the parametrium participates in the infective process as well as in the protective reaction by throwing out an exudate which is usually sufficient to confine the invaders. If the resistance of the host has been reduced by excessive trauma or blood loss, or the virulence of the infecting bacteria is sufficient to overcome this protective barrier and enter the lymphatics the infection may reach the blood stream. Parametritis with its parametric exudate must be considered a protective process. The reaction on the part of the parametrial cellular tissues to bacterial irritation; for in the latter weeks of pregnancy, Hofbauer has shown that there is a definite increase in the lymphocytes and in the large protective cells called clasmatocytes in the parametrial tissues which surround the lower uterine zone, a protective mechanism which has apparently developed to control infective invasion. Hence, in a cervical wound which extends into the lateral fornices the ordinary protective barriers are at once established by hyperemia, the escape of serum into the cellular tissue, cell migration and tissue cell pro-

liferation—the mechanism is in every way similar to that which occurs in any inflammatory reaction—the only difference being the tissues involved and their wealth of lymphatic drainage.

Endometritis is the most common lesion, here the placental site and the entire interior of the uterus with its decidua may become inoculated by surface bacteria—these are usually non-pathogenic, although Schottmüller, Schwartz and Dieckman have shown that anaerobic streptococci are particularly active in this form of infection. Usually the firm contraction and retraction of the uterus blocks the venous return through the terminal venous radicals in the basal endometrium. These become engorged and if contraction is maintained, serum escapes and cells migrate into the underlying stroma. This irritation causes a rapid cell proliferation of small round tissue cells and establishes a definite sub-endometrial cellular barrier against invasion which owing to cutting off the blood supply results in a superficial tissue necrosis of the thickened endometrial lining which is cast off piecemeal in the lochial discharge. It is only when the contraction and retraction is deficient or the infecting organisms overpowering that there is any defection in this perfect physiological protective mechanism. Virulent streptococci or staphylococci have the power of penetration and may produce little or no local reaction in their passage through the pelvic lesion. The superficial necrotic tissues afford an ideal culture medium for bacterial multiplication. Hence, when contraction and retraction does not occur or is not maintained, the protective wall is deficient and invasion by bacteria may take place through the lymphatic chains of drainage into the uterine wall, the parametrium, and from there through the lymphatics and thoracic duct to the circulation producing bacteremia.

While this is the general picture, the lesions in puerperal endometritis vary considerably according to the microorganisms concerned, for each organism seems to have a specialized power of attack—when the placental

site is involved the organisms grow into the thrombi which are not well organized by firm contraction and retraction, fail to block the sinuses of the site and become infected by the bacteria from within the uterus, a thrombophlebitis results—in reality this is primarily a metro-thrombophlebitis which later extends into the larger veins of the pampiniform plexus to the ovarians and hypogastrics. Thrombophlebitis, like every other inflammatory reaction is nature's attempt at a conservative process. Extension of the thrombus beyond the uterine wall or even in it, is but the piling up of cellular defense, while the multiplication of bacteria and the softening and liquefaction of the thrombus is the destruction of this defense—hence, when a drop of pus or a small infective embolus escapes into the circulation beyond this protective barrier a chill occurs, this chill is the signal of distress and is usually followed by a rise in temperature. Pyrexia is the evidence of *cellular activity* which results in further clot formation so that further leakage is temporarily blocked. It is when the bacteria multiply with such rapidity that they overcome this defense and liquefy the clot, that we have a bacteremia produced. Occasionally, there is rapid extension through the walls of the uterus to the perimetrium, and peritonitis becomes the prominent lesion—fortunately this is not the rule.

With this cursory discussion of the consecutive steps which take place in the pathologic picture the therapy of this serious condition can be more easily understood: The best treatment of childbed fever is its prevention which includes:

- (1) The aseptic conduct of labor—*rigid surgical cleanliness*. The progress of normal labor can be watched by abdominal and rectal examination—when, however, there is any doubt as to the diagnosis or progress, *vaginal examination must be used*. This means digital exploration through a clean vulva with a gloved hand, and prevention of mixed infection from the throat and nares of the operator by the use of the face mask.



(2) The membranes should be preserved when possible until the cervix is completely dilated and the membranes protrude well into the vagina. The longer the membranes are kept intact, the less birth injury will occur.

(3) The seriousness of birth injuries may be minimized by closing such wounds by aseptic repair before they become inoculated with pathogenic bacteria.

(4) Blood loss in the third stage should be controlled by complete and timely evacuation of the placenta and membranes and firm contraction may be secured by the employment of pituitary extract and ergot preparations.

(5) Uterine and vaginal drainage is favored by maintaining contraction and the employment of those postures which favor drainage.

Cases which have sustained severe trauma or are potentially infected by repeated vaginal examinations or intra-uterine manipulations may be immunized by injections of anti-streptococcic serum. Lash has shown that immunization can either be done before labor or during labor and that in the case of patients so immunized the incidence of severe infection is definitely reduced.

Endometritis prurida is the most common primary puerperal lesion—this is evidenced by the presence of pyrexia, a slightly accelerated pulse rate, a large, soft, poorly involuted uterus, tender to touch which on vaginal examination shows an open cervix through which is discharged a profuse bloody or clotted lochia, *fetid in odor* and containing gas bubbles. Uterine relaxation is commonly evidenced by the expulsion of clots associated with uterine pain, prolonged after-pains. This is the primary lesion and should be promptly controlled by stimulating contraction and retraction of the uterine muscle by the hypodermic injection of pituitary extract and gynergin, and the application of an ice bag to the abdomen over the fundus—these agents contract the uterus and the elevated trunk posture favors drainage. This posture should be changed from time to time by instructing the patient to

turn over on her abdomen and thus empty the vagina of its accumulated discharge and detritus. Cell resistance may be increased by the intravenous injection of 50 c.c. of a 50 per cent solution of glucose (dextrose) in ampules. These injections should be supplemented by regular intramuscular injections of pituitary extract; which according to Hofbauer, increase the defensive mechanism by the production of myelocytes. *All septic cases benefit from small repeated blood transfusions given early.* This is particularly evident in the woman who has lost considerable blood, whose resistance to infection is materially decreased—such cases demand small and repeated blood transfusions. *Blood transfusion does more good early than late* in combatting an infective process. Blood is not only a food but it stimulates cell production.

If after twenty-four hours of the above treatment the uterus remains large, soft and poorly contracted with associated temperature and pulse rise, the instillation of two to four ounces of sterile glycerine, which is introduced into the uterine cavity through a sterile catheter which is held in place by a vaginal pack against the cervix, will stimulate contraction and aid in the formation of a defensive wall of leucocytes and small round cells in the basal endometrium and contiguous myometrium. This method of Hobbs has had very general acceptance by the British and Irish obstetricians—and our limited experience has justified their claims for it in producing contraction, retraction and drainage.

When the infection is due to a virulent streptococcus or staphylococcus the local lesion in the uterus is comparatively slight—the uterus has usually involuted, the cervix is closed and an irritating serosanguinous or serosanguinopurulent discharge escapes into the vagina or the discharge is scanty and free from odor.

Curettage, curettage and intrauterine douches are dangerous procedures for they break down nature's protective barriers and allow invasion into the deeper structures. When infection extends beyond the confines of the uterus

into the pelvic veins or into the parametrium, general supportive measures or measures which control bacterial growth need to be instituted.

We are of the opinion that thrombophlebitis is not a surgical condition except in those rare instances where it is possible to make a diagnosis of metro-thrombophlebitis before extension into the pelvic veins has taken place—here, alone, is hysterectomy possible after blood transfusion. Ligation has not given sufficiently satisfactory results to justify its use.

Parametritis is treated by posture, an ice bag over the affected areas, small enemata and the intramuscular use of foreign proteins such as milk and blood to increase the leucocytic resistance. But few parametrial exudates terminate in abscess—approximately 6 per cent, hence surgery here has but the limited field of vaginal or extra-peritoneal incision and drainage. Bacteremia depends on the number of colonies and type of infecting bacteria circulating in the blood. The clinical picture of severe blood stream infection is well known—but what to do for it is still a mooted question. Numberless drugs have been suggested for the destruction of the organism; such as solutions of formalin, acriflavine, gentian violet, salvarsan, mercurochrome, metaphan, etc., but up to the present time none have stood the test.

In every general infection our efforts should be directed toward aiding nature in her resistance against infecting bacteria and favoring their destruction and by maintenance of the serum fluids. This means the free exhibition of fluids; saline by hypodermoclysis, intravenous injections of glucose and Ringer's solution; small repeated blood transfusions. Fresh air and sunlight increase cell resistance and improve the general wellbeing of the septic patient. Intramuscular injections of foreign proteins as blood and milk increase the leucocytic reaction; while the intravenous injection of 10 c.c. of metaphan has had many enthusiastic supporters. Recently we have had some miraculous improvement from the liberal use of the Lash

serum given daily in 40 c.c. doses; in spreading peritonitis, stab wound incision and drainage of the culdesac and abdomen have occasionally saved a life—but surgery is seldom justified in puerperal infection, except for the drainage of localized collections of pus. We can summarize the curative treatment of infection, as:

1. Firm uterine contraction
  2. Supportive measures
  3. Fresh air and sunlight
  4. Early and repeated blood transfusion
  5. Stimulation of leucocytic reaction with foreign proteins
  6. Incision and drainage of localized collections of pus
  7. Finally: Give intelligent aid to the development of nature's defensive mechanism.
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# THE THERAPEUTICS OF ULTRAVIOLET LIGHT

ALFRED F. HESS

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It has been realized only for a few years that the invisible or ultraviolet rays of the sun have wonderful curative power. Not that this fact had not been mentioned before, but as long as such statements were incapable of proof physicians were skeptical, and were content to consider sunlight as a source of visible and of heat rays. This is but one more example of the authority and importance of experimental medicine. As soon as it could be conclusively shown by the x-ray that animals are cured of rickets by ultraviolet irradiation, this form of treatment was taken up, not only by the medical profession, but by laymen, until today the enthusiasm is too great and the propaganda too active.

As yet, however, if we confine ourselves to what has been proved, the therapeutic field of ultraviolet energy is greatly limited. These rays have been definitely shown to be of specific value in the prevention and the cure of rickets, a widespread disorder of infants. More than one-half of the infants of large cities such as New York suffer from rickets to a greater or less degree, although as they reach the second or third year of life they generally recover without any specific treatment. Ultraviolet rays have been shown to be of value also in tuberculosis of the skin, bones, joints and glands, but not in tuberculosis of the lungs. These invisible rays are also of value in some skin disorders, more particularly in ordinary infections such as furunculosis. If treatment was limited to these diseases, all would be well, but nowadays it is being recommended for almost everything imaginable—to prevent colds, for nervous disorders, and more particularly to infuse new

energy into tired individuals. There is no basis whatsoever for such treatment. Moreover, there is decided danger in laymen prescribing treatment for themselves with lamps which furnish high intensities of ultraviolet energy. Such treatment should be prescribed by physicians. Not that cancer may develop, as has been claimed by some, but that over-irradiation may lead to burns or to an over stimulation of the nervous system with subsequent depression and a diminution in vigor. Lamps of this kind should not be installed in athletic clubs, beauty parlors, etc., where they will be used without knowledge and according to the mere caprice of the individual.

Recently various window-glasses have been manufactured which allow the passage of a considerable percentage of the ultraviolet rays. Such window-panes are of value in sanatoria or in children's rooms where there is a large access of sunlight, especially where there is southern exposure. However, to furnish panes of this kind to office buildings where the light is obstructed by neighboring structures and the employees spend their days at a distance from the windows, serves no purpose whatsoever, for these rays are of value only if they impinge directly on the surface of the body.

In New York City one of the greatest nuisances which prevents people getting the benefit from ultraviolet rays is smoke. The short invisible rays are very readily obstructed in their passage from the sun to the earth. They can not penetrate smoke or mist, so that we are depriving ourselves of their great benefit by using soft coal and by allowing volumes of smoke to belch from the chimneys. This is a post-war nuisance and can be observed in various precincts of this city.

Ultraviolet rays have not only a direct but an indirect action. They can induce new activity into foods. If oils are exposed to the ultraviolet rays of a lamp they are rapidly endowed with specific healing properties and are able to protect against or to cure rickets in a manner similar to cod liver oil. This is one of the remarkable discoveries

of the last decade and is being made use of to prevent rickets, not only in this country, but throughout the world. A fatty substance—ergosterol—is irradiated, and by this means one of the most potent therapeutic agents has been elaborated; many thousand times as potent as cod liver oil. Milk is being successfully activated for this purpose and recently irradiated substance is being fed to cows in order to give their milk healing qualities. It is probable that by one of these measures rickets will practically be stamped out throughout the civilized world, and that infants will have one less nutritional disorder to contend with.

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## BOOK REVIEW

### AN INTRODUCTION TO MEDICINE<sup>1</sup>

Here is a book conceived and executed on lines long anticipated and long wanted, namely an introduction to the science and art of medicine for the student and cultivated reader, serious in intention, scholarly in essence, yet conveyed in language of the utmost simplicity. From the times of Celsus and the later Pauline epitome, such summations have appeared down the ages at opportune intervals, but, like the ponderous *summa medicinalia* of the Arabian and mediæval physicians, most of them have been too diffuse and verbose, too clogged with erudition for the general public. Here is a guide-book which can be assimilated without difficulty by the educated layman or the young beginner, affording at once a survey of recent medicine viewed in the light of its past, an essentially modern presentation of what was once called the "principles" or "institutes of medicine," and a system of medical philosophy which is sound, profound and sensible enough to be an adequate lamp for any one's feet. As evidenced by the success of the de Kruif book, there are thousands of well-educated people, tucked away in this country, who are eager for just such information, who want to know all about themselves, what they are in health, what happens to them in disease and what should be their personal and social adjustments in aid of preventing it. All that the layman needs to know about the history of medicine is deftly interwoven, for Professor Sigerist very intelligently sees that medical history is not so much a scientific discipline as a contrapuntal system of checks and balances upon the findings of medical science, governed and regulated, be it said, by rules as austere and inevitable as those of counterpoint itself.

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<sup>1</sup>*Einführung in die Medizin.* Von Henry E. Sigerist. VI (1 L.), 405 pp. 8°. Leipzig. G. Thieme, 1931.



The book comprises seven sections, *viz.*, the structure and functions of the human body and brain, the sick patient, the signs of disease, the course and terminations of disease, its causes and treatment (including surgery and preventive medicine) and the duties and present status of the physician. The text, lucid and straightforward throughout, presupposes a good education and some extra reading on the part of the reader and for people of this type, the quasi-historical approach, may turn out to be more attractive and informing than most. A few translations will illustrate the philosophic tendency of the book:

"A person falls ill. What does this fact of sickness mean? First of all, a disturbance of the vital rhythm by which all of us live, according to our natures, habits and cultural endowment. . . . Sickness brutally disturbs this pattern of our lives, deflects our accustomed pathways, disorders our sleep and digestion, so that a sick patient must live otherwise than in health. Sickness isolates. It connotes suffering, passivity, exclusion from ordinary avocations, inhibition of movement, general helplessness and dependence upon others. Suffering connotes unpleasant sensations, conditioned by pain, up to anguish or the agony of death. Every grave illness is a *memento mori*. . . . Sickness is Fate knocking at the door. It activates the mind and bends it to contemplation of the infinite."

"We meet an acquaintance on the street, perceive that he is ill and inquire: What is the trouble? He answers: I have a headache. In this banal dialogue, a daily occurrence, we have already the two fundamental views of illness which have obtained everywhere from time immemorial. We inquire about something lacking, a minus quantity, and the patient answers with a plus."

"We may assume *à priori* that disease has existed since life began upon earth. For disease is naught but a mode of life itself under altered conditions."

At the end of his well reasoned argument, Sigerist closes with the present dilemma of the physician, whether he shall become a public servant, the *Asklepios politikos* of Plato, at the expense of his individuality and private benefactions, or go on as of old.

All in all, a book well worthy of translation and general perusal by cultivated readers.

F. H. GARRISON.

# DR. WILLIAM BEAUMONT: HIS LIFE AND ASSOCIATIONS IN PLATTSBURGH, N. Y.\*

HARRIS A. HOUGHTON

Our present interest in the life of Dr. William Beaumont largely concerns those periods within which he either resided or visited in Plattsburgh, and between 1832 and 1835 when, moving about in quest of further knowledge on the subject of gastric digestion, he was obliged to leave his wife and children in the care of relatives.

Dr. Beaumont was born at Lebanon, Connecticut, Nov. 21, 1785, and therefore was approaching his twenty-fifth birthday, when he completed a two-year apprenticeship under Dr. Benjamin Chandler at St. Albans, Vermont. He received a license to practice physic and surgery "the second Tuesday of June, 1812" from the Third Medical Society of that State. In the same month, the War of 1812 opened. "Young Beaumont saw his opportunity, not only to display his patriotism, and to put into immediate practice the theory of medicine and surgery which he had imbibed in the village of St. Albans, but also a chance

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\*Read before the Section of Historical and Cultural Medicine of the New York Academy of Medicine, May 14, 1930.

The author is, of course, indebted to various publications on the life of Dr. William Beaumont, notably: "*Life and Letters of Dr. William Beaumont*," by Jesse S. Myer; Dr. William Osler's distinctive essay presented to the St. Louis Medical Society and printed in the *Journal American Medical Association*, November 15, 1902; and, the Beaumont Lecture of 1929, "*Dr. William Beaumont, an Appreciation*," by Dr. Walter R. Steiner of Hartford, Connecticut, delivered at the Cardiac Round Table of the Physicians Hospital of Plattsburgh, August 24, 1929 on the occasion of the unveiling of a tablet placed on the site where Dr. Beaumont opened his first drug store and began the practice of medicine. This address will be found in *The Medical and Surgical Year-Book of the Physicians Hospital*, 1929, i, 191.

The author is equally indebted to Mrs. Jeanette Tuttle of Plattsburgh, curator of the Kent-Delord House Museum.

to earn money, of which he was sorely in need. He crossed Lake Champlain to Plattsburgh, where a portion of the Army of the North under General Dearborn was encamped, presented his credentials to the proper authorities, and on September 15th was promptly received into the army as surgeon's mate in the Sixth Regiment of Infantry on brevet from General Bloomfield."

So far as is known this was Dr. Beaumont's introduction to Plattsburgh, though he may have been a visitor while teaching school at Champlain, a village somewhat to the north, prior to his apprenticeship at St. Albans.

It is said that there was little activity in the army at this time, and Dr. Beaumont suspended duty, starting the private practice of medicine and surgery January 1, 1813, probably at Israel Green's Tavern. Orders to accompany his regiment to Sackett's Harbor reached Camp Saranac, situated on the Saranac River just above Plattsburgh, in March, 1813, and a few days later began the expedition which terminated in the Battle of Little York, April 27, 1813—an expedition full of hardship for those who participated.

In due course, Dr. Beaumont returned to Plattsburgh with his contingent, and took an active part in the medicine and surgery incident to the land engagement now known as the Battle of Plattsburgh. The main part of this engagement was fought September 11, 1814, and took part largely in the streets of the village itself, only a short distance from Israel Green's Tavern.

From this time, Dr. Beaumont remained in Plattsburgh until May, 1820, when he departed for Fort Mackinac—an army surgeon for the second time and regularly appointed as a post surgeon. The first exhibit herewith (Fig. 1) has to do with a time shortly after the Battle of Plattsburgh, when Dr. Beaumont indicates by two signatures to a quartermaster's receipt that he had drawn a total of \$15.60 in commutation of rations. Other signatures in this list are of local interest. The original is in possession of the General

Subscribers acknowledge to have received from *Major Matthew*  
*W. D. Under*, the amounts annexed to our names, in commuta-  
 of Rations, as herein specified.

Rations Meat.	Rations Bread.	Rations Liquor.	Rations Candles.	Rations Soap.	Rations Vinegar.	Rations Salt.	By whom received.	AMOUNT.	
								Dolls.	Cts.
							<i>Joshua Quinn</i>	11	—
							<i>W. C. Cassatt. Col.</i>	8	63
							<i>Isaac Hays</i>	3	75
							<i>Markus Baker</i>	—	50
							<i>James H. Toney</i>	12	50
							<i>Jonathan Kilgore 2nd</i>	4	00
							<i>Henry Huxley</i>	2	75
							<i>Benjamin Hays</i>	1	50
							<i>James Russell</i>	1	50
							<i>Wm. C. Langford Jr.</i>	—	60
							<i>Joseph Humes</i>	1	37
	156	342	256				<i>Brazilia Hicken</i>	20	52
							<i>John Humes</i>	9	25
							<i>William Beaumont Jr.</i>	6	—
		82					<i>Stephen Merrill Jr.</i>	16	89
	70	130	200				<i>Brazilia Hicken</i>	13	35
							<i>Wm. Humes Jr.</i>	42	50
							<i>William Beaumont Jr.</i>	5	60
							<i>Wm. Humes Jr.</i>	5	70
							<i>Wm. Humes Jr.</i>	—	50
							<i>Wm. Humes Jr.</i>	2	75
							<i>Wm. Humes Jr.</i>	10	75
							<i>Wm. Humes Jr.</i>	7	75

Fig. 1  
 Quartermaster's receipt.

Benjamin Mooers Chapter, Daughters of the War of 1812, and is one of several with Dr. Beaumont's signature. On one occasion he acknowledged the receipt of vinegar to an extent which made it probable that he did not need a further supply for some time.

The Clinton County Medical Society was organized in 1807 under a general state law, and is therefore one of the oldest among its sister organizations of the State Medical Society. The early minutes or proceedings have been preserved, and are now in the possession of Dr. Lyman G. Barton, Sr., of Plattsburgh, at present a vice-president of the Medical Society of the State of New York. Therein are several pages of interest at the present moment.

Under date of January 19, 1819, with six members present (Fig. 2) the minutes say that "Dr. Wm. Beaumont of Plattsburgh presented himself for examination (turning page, Fig. 3) and admission as a member of this Society—After Ballotting it appeared he was admitted as a member of the Same. Dr. J. W. Wood came in and took the chair—Dr. Beaumont signed the Constitution & bye Laws & paid into the Treasury two Dollars." Proceeding to the election of officers, Dr. Beaumont was made one of three "Sensors" with Dr. B. Moore of Champlain, and Dr. F. Parker of Peru as colleagues.

The above offers a slight and unimportant correction to a statement by Dr. Jesse Myer (p. 66) in which it is represented that Dr. R. P. Allen was admitted to membership in the Society at the same time as Dr. William Beaumont. It would appear that Dr. Allen was admitted later in the session.

Dr. Beaumont completed the membership requirements by signing the constitution, this signature appearing on p. 12 of the secretary's book (Fig. 4). It will be noted that Dr. Samuel Beaumont signed somewhat later. Dr. Samuel Beaumont, first cousin of Dr. William Beaumont, assisted the latter in the publication of the book on the physiology of digestion, Dr. Samuel Beaumont having had some experience at the printer's trade.



Dr. Samuel Beaumont began the practice of medicine in Plattsburgh at Israel Green's Tavern, later moving to a house on Charlotte Street, a short distance away. This house is still in use. Dr. William Beaumont's signature to the "bye Laws" (Fig. 5) appears below that of Dr. Samuel Beaumont, leading to the thought that signing the "bye Laws" was a neglected function at the time of admission. The minutes of a later meeting indicate that Dr. William Beaumont was on the Committee which "examined" his cousin and passed on the latter's qualifications.

Why Dr. William Beaumont joined the County Society only after a residence of nearly eight years in the community does not appear. Perhaps, it might be attributed to unsettled conditions following the War of 1812, although many meetings of the Society were held.

In passing it is interesting to note that the Clinton County Medical Society on its organization in October 1807, adopted a list of prices.

	\$	c.
For each visit, .....	.25	
riding per mile, .....	.20	
Dr. in the night, .....	.38	
Consultation, .....	1---	
Cathartics, vz Sulphas Soda .....	.13	
all other Cathartics, .....	.25	
Emetic, of Tartris Antimonii .....	.13	
all other Emetics, .....	.25	
Tinctura Opii, Do. Camph. Ess. Mentha, Spts. Lavenda Co. Spts. Nit. Dulcis, Aci- dium Sulph. dilute, Ol. Suc. & c. per oz. . .	.50	

On the next page we are informed that the rate for an obstetric case was \$3.50, presuming that the doctor could get it.

We now turn to an association which Dr. Beaumont enjoyed in Plattsburgh, and which clearly indicates the high regard which he achieved even in youth. Situated on Cumberland Avenue, Plattsburgh, and overlooking the place





where the Saranac River empties into Lake Champlain, and with a magnificent view of the famous Green Mountains of Vermont, stands a commodious wood dwelling now known as the Kent-Delord House. The main portion was erected by Nathan Averill, Sr., who came to what was to be Plattsburgh with the Platts, and whose wife Roxana was the first white woman in the new settlement. The house is a type known as that of the Early Republic, two other dwellings of the same architectural style still remaining in the same neighborhood.

The property deeded by James Kent and his wife Elizabeth Bailey Kent had come into the latter's possession from her father, Colonel John Bailey of Poughkeepsie, noted Revolutionary War patriot. He had received it from his son William, a young surveyor, who in 1798 had "paid taxes on a small house on the lakeshore." James Kent, who achieved a remarkable standing in knowledge of the law, was that Kent who was the author of the seven volumes known as "Kent's Commentaries," the first attempt to codify American law, books which I am told have run into thirty editions. They are still standard.

James and Elizabeth Kent transferred this property, August, 1810, to Henry Delord, who was a judge of the Court of Common Pleas. Henry Delord was a native of Nimes, France, and had an uncle who owned a large sugar plantation on the Island of Martinique. Delord went there at the age of twenty in May, 1784, for business purposes.

After the Island had been taken by the English following twelve years of revolutionary turmoil of all kinds, slave insurrections and bloodshed, young Delord made his way to America, and finally to a settlement in the northern wilderness, Peru, which had been set off from the older settlement of Plattsburgh. There he built a large house of wood, which stood for a century before its destruction by fire. Judge Delord became the first postmaster of the town, as well as tavern and storekeeper. It was in this home that Louis Phillippe, the citizen king of France, found refuge while in this country.



Judge Delord died March, 1825, in the home which he had purchased from Justice Kent at Plattsburgh. His widow afterwards married Justice Swetland, also an eminent lawyer, whom she survived, the property descending on her death to her granddaughter, Frances Delord Webb, an infant left by her only child, Frances Webb. This granddaughter was the wife of the Rev. Francis Bloodgood Hall, a clergyman of the Presbyterian Church. Both spent their lives in the service of others. Mrs. Hall studied medicine to some extent in Philadelphia, practicing in a limited way among the poor and needy of Plattsburgh. She died October, 1913 at advanced age, and by her will the homestead with other real estate became the property of the Physicians Hospital of Plattsburgh. At the present time it is being maintained as a public museum by the William H. Miner Foundation. Among other books in the library of this old home was a copy of the 1844 (Burlington) edition of Dr. Beaumont's "Physiology of Digestion" and a copy of the first edition of Osler's Medicine.

This house was also used as a club house by the officers of the British Army under General Provost, who arrived there September 6, 1814, and left hurriedly after the Battle of Plattsburgh, September 11, 1814. Their flight was so precipitate that they left behind a heavy wooden chest, containing a silver tea service and some tea. This now forms a part of the collection there housed.

For many years Judge Delord kept a diary, and in reading the page here given (Fig. 6) it should be remembered that he learned English long after he became of age:

a Thaw 15 february which last thereabout Seven days a thunder & lightening the 17d most the snow gone & what remained very soft cannot bear horse a roads cover with water—this caused a Consternation amongst the lumbermen—

Doctor Beaumont ordered to Michael Mackina to be there in May next—it will really a loss to this place—Carter the Shoe Maker burried yesterday greatly regretted—died in Consequence of a Cold taken by the fatigues & exertions while the house of I I Green was in fire

the 22 inst and the Birthday of Gl Washington we had a Ball at Mr Israel Green—the room was ornimented really with taste and ele-



gance and neatness really Aunt Deborah is "le' je ne suis Quoy" (incomparable?) the simatry of the arrangements of the room were admirable. I never in Europe see such magisti of fancy—wished very much our friends of the 6\*—The Colors of your regt contributed much in decorations.

At this point romance appears. "Aunt Deborah" who was "incomparable" in arranging the decorations of a General Washington birthday ball, was none other than the future wife of Dr. William Beaumont, the daughter of the Quaker Tavern Keeper, Israel Green.

Israel Green was a very much respected member of the community. The site of his Tavern is marked with a sign on the building now occupied by Armour & Co., Bridge Street at the head of Charlotte Street, where one turns on Route No. 9 from the south to approach the business section of the city. Diagonally opposite is an old brick building, reputedly (without much evidence to support the idea) the home of Alexis St. Martin during the time that Dr. Beaumont was publishing the first edition of his book in Plattsburgh and was also performing the fourth and final series of experiments.

To have commanded the notice of Judge Henry Delord, a man acquainted with the refinement of French living standards in the middle of the eighteenth century, "Aunt Deborah" must have been a remarkably capable woman. After her marriage to Dr. Beaumont she spent much of her life with him in the western wilderness. The more we learn of her, the more we are impressed with her dignity of character, her motherhood, and her physical charm.

Dr. Beaumont came to Plattsburgh and went, but left an indelible mark. The periods of his sojourn may be summarized as follows:

1. From September 13, 1812 to May, 1820, during which period he participated in the expedition to Sackett's Harbor and Little York. He took part in the Battle of Platts-

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\*Doubtless referring to the Sixth Regiment of Infantry.

a thaw 15 february which last thereabout seven  
days a thunder & lightning the 17<sup>th</sup> & most the snow gone  
& what remains waty soft that cannot bear short a road  
cover with water - this cause a constipation among  
the lumber men -

Doctor Beaumont ordered to Michael Mackinac  
to be there in May next - it will really a loss to this  
place - Carter the shoe maker was buried yesterday  
generally regretted - died in consequence of a cold  
taken by the fatigues & exertions while the house  
of J. J. Green was infirm -

The 2<sup>d</sup> I visited the Birth Day of G<sup>o</sup> Washington  
we had a Ball at Mr. Israel Green - The room was  
ornamented really with taste and elegance and nothing  
really suited Delord as "le je ne sais quoy" the  
simplicity of the arrangements of the room was admirable -  
I accompanied <sup>several</sup> magistrates of the place - wished very much  
our friends of the C<sup>o</sup> - The tables of your reg<sup>t</sup> contributed  
much in decorating

Fig. 6

A leaf from the diary of Judge Henry Delord. (Courtesy of the William  
H. Miner Foundation.)

burgh as surgeon's mate with a distinction which brought a citation. He also began the practice of medicine and surgery.

2. For a short time in the fall of 1821, during which period he married "Aunt Deborah" (Green) Platt.

3. For a short time in the latter part of 1832, following which he left his family in Plattsburgh, and went to Washington, New York and New Haven. During this period a child died and was buried in Riverside Cemetery.

4. For a short period early in 1833, Dr. Beaumont was in Plattsburgh, and later in the year again for several months to attend to the publication of his book on gastric digestion. The presence of Alexis St. Martin was secured, and the fourth series of experiments were recorded. Apparently this was the last visit of Dr. Beaumont to the place "where he entered the army, where he began the practice of medicine among its inhabitants, where he married his wife, and where he conducted two of his now world-famous series of experiments upon the physiology of digestion." (Steiner).

Dr. Beaumont died in St. Louis, April 25, 1853—

Since the above was written, it has been my fortune to find what appears to be a contemporaneous drawing of the United States Hotel, earlier known as the Israel Green Tavern (Fig. 7). The original picture is a beautiful example of the wood engraver's art, and appeared in *Harper's New Monthly Magazine*, July, 1864, p. 147. This picture embellishes an article by B. J. Lossing, *Scenes in the War of 1812. X. Lake Champlain and the New England Coast*. Lossing was both artist and historian, and this sketch is said to have been made by him during a visit to Plattsburgh just prior to the opening of the War between the States.

The top story of the building was used in its early days as a meeting room for the Masonic Lodge. The assembly room, where Judge Delord attended the General Washing-

ton ball of the "incomparable Aunt Deborah," is on the second floor. Dr. Beaumont resided in this building during his earliest Plattsburgh residence and presumably wooed, won, and married "Aunt Deborah" within its confines.

His cousin, Dr. Samuel Beaumont, was a practitioner for many years in Plattsburgh, and began his medical practice in this building, moving, as has been stated, after several years to a house only a short distance away.



*Fig. 7*



## HERMANN MICHAEL BIGGS

### MEMORIAL LECTURE

The Memorial lectureship which bears the name of Hermann Michael Biggs was founded by his widow. At first it was given under the auspices of the New York Tuberculosis and Health Association and the Medical Society of the County of New York. Last year it came under the aegis of The New York Academy of Medicine, and the first lecture as an Academy event will be given on Thursday evening, May 7, 1931, at half past eight o'clock, and will take the place of the first Stated Meeting for May.

The first lecture was delivered in 1925, by Dr. William H. Park, on "A survey of some broad phases of tuberculosis."

The other Biggs Memorial Lectures have been delivered by Dr. S. Lyle Cummins, in 1926, on "Clinical differences in tuberculosis"; Dr. Allen K. Krause in 1927, on "Tuberculosis and public health"; in 1928, Dr. Charles E. A. Winslow who chose as his title "The contribution of Hermann A. Biggs to public health." Dr. John H. Stokes was the lecturer in 1929, speaking on "The syphilology of today and tomorrow."

There was no lecture in 1930 and the program for this year, under the auspices of the Academy, will have as the speaker, Dr. George H. Bigelow, Commissioner of Public Health of the Commonwealth of Massachusetts. The subject of the lecture will be "The control of chronic diseases."

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## RELATION OF THE MEDICAL PROFESSION TO "BIRTH CONTROL"

The New York State Penal Law, under Section 1145, exempts physicians from the provisions of Section 1142 by stating that:

"An article or instrument, used or applied by physicians lawfully practicing, or by their direction or prescription, for the cure or prevention of disease, is not an article of indecent or immoral nature or use, within this article. The supplying of such articles to such physicians or by their direction or prescription, is not an offense under this article."

Many physicians are not aware of this exemption. In this regard, the Committee desires to call attention to the fact that, without violating the letter of this law, its violation in spirit may easily be effected by one who, being a licensed physician, endows the word "disease" with its broadest meaning. Such interpretation may well be fraught with consequences which the law does not contemplate and which we believe to be deprecated by enlightened medical and lay opinion. For these reasons those institutions where contraceptive advice is given must be so supervised that the spirit of the law, as well as the letter, will be given due consideration.

In the judgment of this Committee, the public is entitled to expert counsel and information by the medical profession on the important and intimate matter of contraceptive advice. Owing largely to the negative attitude of the profession and to the lack, until recently, of any scientific research in this field, extra-mural clinics have been stimulated by organizations interested primarily in birth control. Recently, however, clinics for giving contraceptive advice have been established in several cities in connection with hospitals or under the direct control of recognized medical bodies. In New York City there are nine hospital clinics of this type. Their combined attendance, however, is very much smaller than that of the Birth Control Clinical Research Bureau.

The modern tendency in clinic organization is away from detached dispensaries. The so-called unattached clinics are gradually being abandoned and the work taken over under the direction of the hospital. It is for this reason that the work of the medical group at the Birth Control Clinical Research Bureau can only be regarded as a temporary addition to the clinical resources of the community until such time as this work be taken over entirely by recognized hospitals and clinics, and by the profession in private practice.

Contraceptive clinics might prove to be health examination stations of great importance. Lacerations, erosions, and displacements, calling for treatment or operation, are many and are frequently overlooked. It is imperative, therefore, that the physicians in charge of birth control clinics ought to have had training in gynecological work in order to be qualified to direct or to refer patients to have cervicitis cured, injuries repaired, or displacements corrected. This service likewise offers opportunities for the detection of early cancer or communicable disease. All the contraceptive clinics should be under adequate medical supervision and should be regularly inspected by experienced gynecologists and obstetricians.

The conservatism of the medical profession with reference to contraception has been justifiable. Recent research in contraceptive technique, however, now demands recognition on the part of the profession of medicine. The guidance of the public in sexual matters should be assumed by the medical profession wherever it naturally comes within the scope of its work. It is likewise worth emphasizing that because of their present detachment from recognized agencies, the existing extra-mural clinics should have the benefit of the expert advice of recognized medical groups. The absence of education of the public in sexual matters by the medical profession is mediæval; it is to be deplored, and efforts should be made to change the present attitude of physicians.

## RECOMMENDATIONS

1. The New York Academy of Medicine, as a medical organization, should be concerned solely with the medical and public health aspects of birth control, and not with its economic considerations.

2. The contraceptive clinics already in existence in the various hospitals, and operating within the law solely in the interest of the health of the individual, should be continued, and all institutions in which this service is required should organize similar clinics as integral parts of dispensary and hospital service.

3. All extra-mural clinics, when their existence is temporarily justified, should have a medical personnel of competent physicians with especial training in gynecology; the clinics should secure the services of local gynecologists and obstetricians of recognized standing and authority to serve in an advisory capacity and to formulate and enforce suitable rules and regulations concerning the medical indications for the giving of contraceptive advice and to make regular inspections to see that these rules are observed. Efforts should likewise be made on the part of these extra-mural clinics to obtain the services of experienced physicians in the several branches of medicine to aid the staff in the diagnosis and conduct of the more difficult cases. The extra-mural clinics, if so safeguarded and supervised, should receive support of the medical profession only until a sufficient number of hospital clinics has been developed to meet the public health demand.

4. A movement should be begun to include in the curriculum of medical schools, instruction in modern contraceptive measures and in the indications therefor. The hospital clinics should likewise be asked to offer similar instruction to practicing physicians.

## LIBRARY NOTES

### TWO MANUSCRIPTS FROM THE BEEKMAN FAMILY

The trains thunder over the Queensboro bridge; trucks rumble over uneven pavements; children shriek at their play in the noisy streets, where a century or two ago the banks of the East River was a desirable spot for the citizens of New York to retire for quiet summer holidays. There in 1760, among a rich growth of trees, overlooking the river with its occasional traffic, a stately mansion was erected which was to figure in the American Revolution. Any connection between the Academy of Medicine and this dignified old building, long since torn down to make way for the expansion of our city, may seem a bit vague. Yet it recently came to our attention that two large tomes which lay side by side on the shelves of that eighteenth century mansion, after following diverging paths for a hundred years, have finally been brought together again in our library.

On Christmas day in 1646, a small vessel set out from Holland to make the long perilous sea voyage to this country which then presented as much danger as a flight by air today. Amid the firing of guns from the fort and enthusiastic shouts of the townsmen, on the 11th of May, 1647, the haughty Peter Stuyvesant arrived in New Amsterdam as Director General of New Netherlands. With him came William Beekman, a lad of twenty-three, the first of a long line of gentlemen bearing that name who made their home in this city. He became Vice-Director of the New Netherlands and an active and respected member of the colony. He insisted that his sons be benefited by a good education, and accordingly in spite of the dangers and expenses incurred by a trip abroad, sent them both to Holland. The older son, Henry, died there, leaving Gerardus to carry on the family name. He pursued the study of medicine at the University of Leyden, and as he was a

student there in 1671, no doubt was among those privileged to hear the lectures of Sylvius. Franciscus Sylvius, 1614-1672, called in his day the "Oracle of Amsterdam" was from 1658 until his death a famed and popular teacher of the practice of medicine at the University of Leyden. The two volumes that have come to us from the Beekman library are Dutch translations in manuscript of Sylvius's *Praxeos medicae*, first published, 1672-1674. The earlier one bears the signature of Gerardus with the date 1674. The wide margins are crowded with notations which were perhaps gleaned from the lips of Sylvius himself.

When Gerardus returned to this country, New Amsterdam was already in the hands of the British. In spite of the scarcity of well trained doctors in the colonies he did not devote himself to his profession but followed the dictates of his heart and turned to the more exciting career of politics. He was seriously involved in what was known as the Leisler rebellion and was under sentence for death, but was freed eventually by an appeal to the King. He managed to regain favor, however, and from 1702 until his death in 1723 was a member of the Governor's Council. His second son, William, was born in 1684. He, too, was sent to the University of Leyden to study medicine. Although he could not have been a pupil of Sylvius like his father, yet he must have been an ardent admirer, for he painstakingly copied his father's book, even the marginal notes. At the end is inscribed: "Dit Boeck heb ick Wilhellemus Beekman geeijndight Door godes Zeegen jnt Jaar onsen heere ijesu Christi 1705.", i. e., "This book have I William Beekman finished through God's goodness in the year of our Lord Jesus Christ 1705." He held to the tradition established by his father, and did not follow the medical profession, although unlike Gerardus, he did not become embroiled in politics. He lived the quiet, comfortable life of a gentleman of the period, luxury loving and cultured. He died in 1770.

James Beekman, second son of William, spent a number of years abroad, studying and traveling. He became a suc-

cessful merchant, adding substantially to the family's fortune. He it was who built Mount Pleasant, the house on the banks of the East River where Fiftieth Street now lies, a handsome mansion, filled with beautiful furnishings and tapestries, well appreciated by the English invaders, for Lord Howe made it his headquarters. Here Nathan Hale was tried and condemned to death. Here Major André went to receive his orders prior to his meeting with Arnold. And here lay the two volumes of Sylvius which we now possess. History does not indicate whether Lord Howe and the other notables spent their leisure moments between campaigns contemplating Dutch books on the practice of medicine. James Beekman in the meanwhile had retired to the safety of a residence outside the British lines, for like most of the wealthy New Yorkers, he took no part in the actual fighting. He died in 1807 leaving several children, among whom were James and John. The former left no children but the latter had two sons. John was one of the many members of the Beekman family who studied medicine, and after the Revolution when the family finances were at a low ebb, he resorted to his profession to tide them over. His son, William Fenwick was also educated as a physician, but was satisfied with a schooling in this country. The two manuscripts had been passed on from the first James to the second James and in each volume is the inscription, "New York, 20 December, 1829, presented by James Beekman to his Nephew William F. Beekman." The earlier volume which came from Gerardus Beekman, stayed in the family. It was given by William Fenwick to his son, William Bedlow, and hence to Dr. Fenwick Beekman, who presented it to the Academy a few years ago. The other book, written by William Beekman, strayed from the family some time after it was given to William Fenwick Beekman. It is impossible to trace its subsequent wanderings. There are not even any records available to indicate from what source it found its way to the Academy. Its heavy binding of panelled calf over thick boards, blind tooled, with heavy brass clasps, has well protected it. The other has a less substantial covering

of vellum with ties. Inscriptions in the latter, dated 1781, indicate that the volume was occasionally used to provide remedies for ailments. Members of the Van Cortlandt, Kips and Darlington families were mentioned as recipients of treatment. It would be difficult now to look to these tomes for advice, unless one were remarkably apt at reading old Dutch and deciphering illegible handwriting. But they remain as records of a more leisurely past and as remembrances of a family prominent in the early days of this city, devoted to the study of medicine.

GERTRUDE L. ANNAN.



## AN EXHIBITION OF BINDINGS

(Main reading room—March 1 to May 1.)

The Academy of Medicine cannot attempt a binding exhibit of great treasures. The collection of fine bindings has become too costly and highly-specialized a pursuit for public libraries. But we have tried in a small way to trace the history of bindings on medical books from the stamped calf and pigskin of the fifteenth century to the simple cloth and polished morocco of modern times.

From the fifteenth century we have six examples, great heavy volumes in sturdy bindings that have stood the handling of over four hundred years. Three of them, from the workshops of German monasteries, are of stamped pigskin over heavy boards, furnished with metal clasps. The leather, color of old ivory, is stamped with designs of birds, beasts and flowers. Two more, one German and one Italian, are of dark calf decorated with formal tooling. The German has corner pieces of worked metal; the Italian has five round studs and six clasps.

Books became smaller with the sixteenth century, and bindings lighter. The Germans changed the least. They still had heavy boards covered with stamped calf and pigskin. But, as the century progressed, the small designs gave way to large panels of religious or allegorical figures. Two of our bindings have portraits of the Emperor Charles V on the front cover, of the elector of Saxony on the back.

The French bindings are more interesting. We have three distinct types, all in calf. The first, a small folio, has running bands of exquisite floral design. The second, a handbook of surgery (Guy de Chauliac, "Pour les barbiers, & chirurgiens") is a chunky little volume of simple design, its calf worn shiny. The third, probably a Paris binding, is the finest. On the front cover is a simple panel of St. Barbara and her tower surrounded by a border of

pineapples and flowers. Unfortunately we have neither French nor Italian bindings of the Grolier type of elaborate strapwork design which was so prevalent at the time. Our Italian bindings are also of calf, tooled or stamped, with some gold decoration.

We show but one English sixteenth century binding, though an interesting one. It is of heavy calf, almost black, and is closed with buttons and loops. It has a central flower motive in gold, much cruder in design than those found on the continent, and it bears the initials of Philip Moore, English medical writer.

With the seventeenth century German bindings lose their priority. We have but one example, still in stamped pig. Other countries, however, are well represented. We show French bindings of limp vellum and of mottled calf over thick boards; English bindings in various shades of calf, simply tooled; and little Dutch bindings of gold stamped morocco.

In fact the seventeenth century marks the rise of morocco. Though it was used in France during the previous century, it was seldom found elsewhere. We have a whole case of seventeenth century red morocco bindings, gold tooled, and mellowed with time and handling. Though there are beautiful examples from various countries, our greatest treasure is English. It is a copy of John Browne's "Adeuochoiradelogia: or... treatise of... Kings-Evil-Swellings" bound by Samuel or Charles Mearne, bookbinders to Charles I. Its foundation of red morocco is inlaid with delicate arabesques in blue, set in intricate gold design.

The eighteenth century continues the trends of the seventeenth. There is mottled calf from Holland and France, vellum over boards from Germany and Italy, panelled calf and gold stamped morocco from England. But the morocco is not as fine as that of the preceding century. It is brighter in color, gaudier in design.

There is a new note, however. For the first time we can show bindings from America, and of three different

types. The first is original cheap paper boards; the second is of simple calf, a rough copy of an English binding; the third is vellum over boards, roughly hand stitched and furnished with brass clasps.

In the next case we have gathered our finest examples of the de-luxe bindings of the nineteenth and twentieth centuries. We have bindings by Riviere, Sangorski and Sutcliffe, Trautz Bauzonnet, the Club Bindery, and others. We have bindings of calf, of sheep, of vellum, of morocco. We have bindings that are gold tooled, blind tooled, stamped; with doublures and with dentelles. Thus it is that private collectors rebind their finest old books. Public libraries can only hope to inherit them.

Binding reached its lowest ebb in the nineteenth century. We still have a few good English and French books in tree calf or colored sheep. But we find Victorianism rampant in cloth, heavily decorated; in paper, marbled or made to imitate calf. Our most extraordinary example is an early edition of Vesalius rebound in pink damask and red bulls-eye paper.

But with the twentieth century binding recovers. In this case we find the contemporary medical books. They are no longer treated as great treasures to be sumptuously bound, as in the fifteenth century. Rather they are instruments to be preserved for use. Here is simple pigskin and paper from Germany, tree calf from Spain, cheap morocco from France, and cloth from every country. And, for the most part, they are decorated with restraint and imagination.

In the last case we have tried to show some of the tricks and details of book binding. There are bindings of painted vellum, of silk, of musical manuscript. There you can see how the binder used what the printer could not dispose of, and made end paper of old printed sheets. And finally we have shown details of decoration such as doublures of leather and silk, gold stamped; and leaves with goffered edges and fore edge painting.

Our greatest treasures, however, lie in the case by the window. They are books of various ages and countries, bearing the devices of well known book lovers. There is a book in simple vellum with the initials D. I. S., and the date 1601, bound for Johannes Siegfried, sixteenth century German doctor. There are three books in brown morocco bound for Jacques Auguste de Thou (1553-1617) famous French bibliophile. De Thou had three coats of arms, the first his own as a bachelor; the second with those of his first wife; the third with those of his second wife. We are fortunate enough to have an example of each.

Above de Thou's are two books from the library of James I of England. Both are in calf, one bearing the arms of the king; the other with the crown over the Tudor rose. Next to these lies a book in simple brown Russia, probably the work of the famous Roger Payne, with the arms of Michael Woodhull (1740-1816) English collector and translator. And lastly, there are two books bound by Riviere and Bedford for William Henry Miller, founder of the famous Christie-Miller library. So in the past book lovers have collected fine medical books and preserved them for us. Let us hope they serve us as well in the future.

The Academy of Medicine wishes to thank Dr. Bernard W. Weinberger for two books, and Dr. Robert L. Dickinson for one book loaned for the exhibit.

Lesta Ford.

## RECENT ACCESSIONS

- Bailey, J. W. The curious story of Dr. Marshall.  
Cambridge, Mass., Murray, 1930, 113 p.
- Biesenberger, H. Deformitäten und kosmetische Operationen der weiblichen Brust.  
Wien, Maudrich, 1931, 209 p.
- Blanchard, M. and Toullec, F. Les grands syndromes en pathologie exotique.  
Paris, Doin, 1931, 473 p.
- Boyd, M. F. An introduction to malariology.  
Cambridge, Mass., Harvard Univ. Pr. 1930, 437 p.
- Boyd, R. H. Diet and care of the surgical case.  
London, Lewis, 1930, 106 p.
- Bready, J. W. Doctor Barnardo, physician, pioneer, prophet.  
London, Allen, [1930], 271 p.
- British Empire Cancer Campaign. The truth about cancer.  
London, Murray, [1930], 124 p.
- Bumm, E. Die äusseren Abdominal-Hernien.  
Berlin, Urban, 1931, 331 p.
- Cabot, H. and Giles, M. D. Surgical nursing.  
Phil., Saunders, 1931, 428 p.
- Cathcart, G. C. The treatment of chronic deafness by the electrophonoïde method of Zünd-Burguet. 2. ed.  
[London], Milford, 1931, 111 p.
- Christie, H. K. Technique and results of grafting skin.  
N. Y., Hoeber, 1931, 67 p.
- DaCosta, J. C. Selections from the papers and speeches of.  
Phil., Saunders, 1931, 440 p.
- Deltour, G. Le régime des aliénés.  
Paris, Chauny, 1930, 129 p.
- De Sanctis, S. Psicologia sperimentale.  
Roma, Stock, 1930, v. 2.
- Deuchler, W. Juan de Cárdenas.  
Bern, Haupt, [1930], 125 p.
- Douthwaite, A. H. The treatment of asthma.  
London, Lewis, 1930, 164 p.
- Dupuy de Frenelle, J. Ostéosynthèse.  
Paris, Maloine, 1931, 334 p.
- Fichera, G. Le colecistopatie nella chirurgia odierna.  
Bologna, Cappelli, 1930, 118 p.
- Fischer, A. Gewebezüchtung; Handbuch der Biologie der Gewebezellen in Vitro. 3. Ausg.  
München, Müller, 1930, 661 p.
- Floyd, R. Studies on the heart, arteries and kidneys.  
[N. Y., Pandick Pr., 1930], 132 p.

- Friedländer, A. A. *Telepathie und Hellschen*.  
Stuttgart, Enke, 1930, 89 p.
- Grafe, E. *Die Krankheiten des Stoffwechsels und ihre Behandlung*.  
Berlin, Springer, 1931, 519 p.
- Gunn, J. A. *An introduction to pharmacology and therapeutics*. 2. ed.  
London, Milford, 1931, 233 p.
- Hayes, E. H. *Forty years on the Labrador; the life-story of Sir Wilfred Grenfell*.  
N. Y., Revell, [1930], 128 p.
- Herd, H. *The diagnosis of mental deficiency*.  
London, Hodder, 1930, 272 p.
- Hill, C. *A manual of normal histology and organography*. 6. ed.  
Phil., Saunders, 1931, 518 p.
- Hinsie, L. E. *The treatment of schizophrenia*.  
London, Baillière, 1930, 206 p.
- Iredell, C. E. *Colour and cancer*.  
London, Lewis, 1930, 106 p.
- Johnson, W. *Because I stutter*.  
N. Y., Appleton, 1930, 126 p.
- Landry, A. *L'hygiène publique en France*.  
Paris, Alean, 1930, 173 p.
- Lasswell, H. D. *Psychopathology and politics*.  
Chic., Univ. of Chic. Pr., [1930], 285 p.
- Liepmann, W. G. *Das gynäkologische Seminar*.  
Berlin, Urban, 1931, 368 p.
- Loeper, M. *Maladies du tube digestif*.  
Paris, Masson, 1930, 369 p.
- Loeper, M.; Labbé, M.; Richet, C. [et al.]. *Aliments médicaments*.  
Paris, Masson, 1930, 328 p.
- Maag, P. *Psychoanalyse und seelische Wirklichkeit*.  
München, Lehmann, 1930, 228 p.
- Martel de Janville, T. and Guillaume, J. *Les tumeurs cérébrales*.  
Paris, Doin, 1931, 134 p.
- Meyer, W. *Cancer; its origin, its development and its self-perpetuation*.  
N. Y., Hoeber, 1931, 427 p.
- Müller, L. R. *Lebensnerven und Lebenstriebe*. 3. Aufl.  
Berlin, Springer, 1931, 991 p.
- Muthu, D. J. A. C. *The antiquity of Hindu medicine and civilisation*. 3. ed.  
N. Y., Hoeber, 1931, 111 p.
- Newburgh, L. H. and Johnston, M. W. *The exchange of energy between man and the environment*.  
Springfield, Ill., Thomas, 1930, 104 p.
- Nicole, J. E. *Psychopathology*.  
N. Y., Dodd, 1930, 203 p.
- Ostwald, W. *Kleines Praktikum der Kolloidchemie*. 7. Aufl.  
Dresden, Steinkopf, 1930, 174 p.

- Pardee, H. E. B. Clinical aspects of the electrocardiogram. 2. ed.  
N. Y., Hoeber, 1930, 242 p.
- Piersol's human anatomy. 9. ed.  
Phil., Lippincott, [1930], 2104 p.
- Popenoe, P. B. Practical applications of heredity.  
Balt., Williams, 1930, 128 p.
- Powell, L. P. Mary Baker Eddy.  
N. Y., Macmillan, 1930, 364 p.
- Putti, V. Historic artificial limbs.  
N. Y., Hoeber, 1930, 63 p.
- Rawling, L. B. Landmarks and surface markings of the human body.  
N. Y., Hoeber, 1931, 97 p.
- Rawling, L. B. Stepping stones to surgery. (Anatomy applied to surgery).  
N. Y., Hoeber, 1931, 227 p.
- Reed, C. B. Operative obstetrics on the manikin.  
Phil., Blakiston, [1931], 314 p.
- Romanis, W. H. C. and Mitchiner, P. H. Surgical emergencies in practice.  
London, Churchill, 1931, 608 p.
- Rutherford, (Sir) S.; Chadwick, J. and Ellis, C. D. Radiations from radioactive substances.  
Cambridge, [Eng.], Univ. Pr., 1930, 588 p.
- Schrammen, A. Die gezeismässigen Ursachen der Umbildung und des Verganges der Tierwelt und des Menschen.  
Hildesheim, Lax, 1930, 176 p.
- Schumann, M. Lehr- und Hilfsbuch für medizinisch-technische Assistentinnen.  
Berlin, Urban, 1931, 916 p.
- Selbert, (Mrs.) N. A. (Sauer). Child health.  
Phil., Saunders, 1931, 261 p.
- Sigerist, H. E. Einführung in die Medizin.  
Leipzig, Thieme, 1931, 405 p.
- Steadman, R. F. Public health organization in the Chicago region.  
Chic., Univ. of Chic. Pr., [1930], 279 p.
- Symons, A. Confessions; a study in pathology.  
N. Y., Cape, [1930], 87 p.
- Walker, (Mrs.) M. E. M. Pioneers of public health.  
N. Y., Macmillan, 1930, 271 p.
- Warren, J. and Green, R. M. Handbook of anatomy, from original dissections by John Warren.  
Cambridge, Mass., Harvard Univ. Pr., 1930, 384 p.
- Wisner, E. Public welfare administration in Louisiana.  
Chic., Univ. of Chic. Pr., [1930], 239 p.
- Wolbarst, A. L. Gonococcal infection in the male. 2. ed.  
St. Louis, Mosby, 1930, 297 p.
- Wurmser, R. Oxydations et réductions.  
Paris, Presses Universitaires de France, 1930, 381 p.

# PROCEEDINGS OF ACADEMY MEETINGS

## MARCH

### STATED MEETINGS

Thursday Evening, March 5, at 8:30 o'clock

*Program presented in co-operation with the*

### SECTION OF HISTORICAL AND CULTURAL MEDICINE

#### ORDER

- I. EXECUTIVE SESSION  
Election of Fellows
- II. PAPERS OF THE EVENING
  - a. The Edwin Smith surgical papyrus and the diagnosis and treatment of injuries to the skull and spine 5,000 years ago, Charles A. Elsberg
  - b. The hierarchy of the Monros, B. Sachs
- III. GENERAL DISCUSSION
- IV. EXECUTIVE SESSION  
Section of Historical and Cultural Medicine  
Appointment of Nominating Committee

Thursday Evening, March 19, at 8:30 o'clock

### THE SIXTH HARVEY LECTURE

"The Coronary Artery in Health and Disease"

JAMES B. HERRICK

University of Chicago

ALFRED E. COHN, President Harvey Society

DAYTON J. EDWARDS, Secretary Harvey Society

This lecture takes the place of the second Stated Meeting of the Academy for March.

### SECTION OF DERMATOLOGY AND SYPHILOLOGY

Tuesday Evening, March 3, at 8:30 o'clock

#### ORDER

- I. EXECUTIVE SESSION  
Appointment of Nominating Committee
- II. READING OF THE MINUTES
- III. PRESENTATION OF CASES
  - a. Cases from City Hospital
  - b. Miscellaneous cases
- IV. GENERAL DISCUSSION



SECTION OF SURGERY  
joint meeting with the  
SECTION OF PEDIATRICS  
Friday Evening, March 6, at 8:30 o'clock

ORDER

- I. EXECUTIVE SESSION  
Appointment of Nominating Committees for both Sections
- II. READING OF THE MINUTES
- III. SYMPOSIUM ON DEVELOPMENTAL PERITONEAL BANDS IN CHILDREN
  - a. Embryology and anatomy, Charles R. Stockard
  - b. Roentgenological findings, Harry M. Imboden
  - c. Symptomatology and medical treatment, Royal S. Haynes
  - d. Surgical diagnosis and treatment, Charles E. Farr
- IV. DISCUSSION OPENED BY Herbert B. Wilcox, Alfred S. Taylor

SECTION OF  
NEUROLOGY AND PSYCHIATRY  
joint meeting with the  
NEW YORK NEUROLOGICAL SOCIETY  
Tuesday Evening, March 10, at 8:30 o'clock

ORDER

- I. EXECUTIVE SESSION  
Appointment of Nominating Committee
- II. READING OF THE MINUTES
- III. NEUROPATHOLOGIC PRESENTATIONS
  - a. Multiple subcortical venous angioma
  - b. Hemato-syringomyelia with intramedullary cord neoplasm, Charles Davison
  - c. Some tumors of the cerebellum, Lewis Stevenson
- IV. PAPERS OF THE EVENING
  - a. Anatomic pathologic consideration on peripheral nerves, George B. Hassin, University of Illinois (by invitation)
  - b. The glioma classifications and neuroglia cell types, Wilder G. Penfield, McGill UniversityDiscussion Samuel T. Orton (by invitation), Charles A. Elsberg, Joseph H. Globus, Byron Stookey, Armando Ferraro (by invitation), Leon H. Cornwall
- V. GENERAL DISCUSSION

SECTION OF  
HISTORICAL AND CULTURAL MEDICINE

The regular meeting was not held on March 11 for the reason that the Section of Historical and Cultural Medicine presented the Stated Meeting of March 5.

SECTION OF PEDIATRICS

The regular meeting was not held on March 12 for the reason that the Section of Pediatrics combined with the Section of Surgery in presenting a joint meeting on March 6.

SECTION OF OTOTOLOGY

Friday Evening, March 13, at 8:30 o'clock

ORDER

- I. EXECUTIVE SESSION  
Appointment of Nominating Committee
- II. READING OF THE MINUTES
- III. PRESENTATION OF INSTRUMENTS  
New models of Spratt's curettes
- IV. PRESENTATION OF CASES
- V. Report of cases from the ear clinics of the New York Eye and Ear Infirmary
  - a. Primary bulb thrombosis, operation, three years later circumscribed labyrinthitis facial palsy, L. Kend (by invitation)
  - b. Primary bulb thrombosis, metastatic abscesses, operation, recovery, Herman F. Lampe
  - c. Acute mastoiditis complicated by internal hydrocephalus, Frank C. Carr  
Discussion, James C. Joyner
  - d. 1. Modified radical mastoid followed by radical mastoid with severe intracranial symptoms  
2. Two cases with severe labyrinth symptoms occurring following O. M. C. C., John McCoy
  - e. 1. Decompression of the facial nerve for facial paralysis following radical operation.  
2. Decompression of the facial nerve for facial paralysis following simple mastoid operation, James Morrisset Smith
  - f. O. M. P. C., mastoidectomy, septicemia, jugular ligation, recovery, John A. MacIsaac (by invitation)
  - g. O. M. P. C., sarcoma of dura, middle fossa, radical mastoid operation, Edgar M. Pope (by invitation)
- VI. PAPER OF THE EVENING  
The temporal bone, its surgical anatomy and variations from the normal.  
Lantern slide demonstration, Mr. Edgar B. Burchell (by invitation)  
General Discussion

SECTION OF OPHTHALMOLOGY

Monday Evening, March 16, at 8:30 o'clock

ORDER

- I. EXECUTIVE SESSION  
Appointment of Nominating Committee
- II. READING OF MINUTES
- III. PRESENTATION OF CASES
- IV. PAPERS OF THE EVENING  
A symposium on the surgical treatment of squint
  - a. The recession operation, P. Chalmers Jameson (by invitation)  
Discussion, W. Thornwall Davis, Washington (by invitation), James H. Andrew (by invitation)

- b. Advancement and other shortening operations for concomitant squint,  
Luther C. Peter, Philadelphia (by invitation)  
Discussion, Conrad Berens, John H. Dunnington

V. GENERAL DISCUSSION

SECTION OF MEDICINE

Tuesday Evening, March 17, at 8:30 o'clock

This meeting is arranged to acquaint physicians with the frequency and diagnosis of tropical diseases in New York City.

ORDER

- I. EXECUTIVE SESSION  
Appointment of Nominating Committee
- II. PAPER OF THE EVENING  
Tropical diseases in New York City, F. W. O'Connor
- III. DISCUSSION  
Edward H. Hume, C. H. Lavinder, U. S. Public Health Service,  
Howard F. Shattuck, Wilbur A. Sawyer (by invitation) George  
Baehr, Commander G. E. Thomas, U. S. Navy, C. V. Noback, Ph.D.  
(by invitation)

SECTION OF GENITO-URINARY SURGERY

Wednesday Evening, March 18, at 8:30 o'clock

ORDER

- I. EXECUTIVE SESSION  
Appointment of Nominating Committee
- II. READING OF THE MINUTES
- III. PRESENTATION OF INSTRUMENTS  
New ureter catheterizing cystoscope  
Improved urethral and vesical evacuator, H. Dawson Furniss
- IV. PRESENTATIONS BY MEMORIAL HOSPITAL—DEPARTMENT OF UROLOGY
- a. A case of renal adenocarcinoma with unusual manifestations, Robert  
F. McNattin (by invitation)
- b. Limitations of the histological grading of tumors, Fred W. Stewart  
(by invitation)
- c. Prognosis in carcinoma of the bladder with especial reference to  
multiple tumors, Archie L. Dean, Jr.
- d. Prognosis of carcinoma of the prostate, Russell S. Ferguson (by  
invitation)
- e. Radiation therapy of carcinoma of the prostate, Benjamin S. Bar-  
ringer
- Discussion, Edward L. Keyes, Alexander R. Stevens, J. Sturdivant Read
- V. GENERAL DISCUSSION

SECTION OF ORTHOPEDIC SURGERY

Friday Evening, March 20, at 8:30 o'clock

ORDER

- I. EXECUTIVE SESSION  
Appointment of Nominating Committee
- II. READING OF THE MINUTES

III. PAPERS OF THE EVENING

- a. Reactions of joints to some injuries and infections, J. Albert Key, St. Louis (by invitation)
- b. Diagnosis of bone tumor by aspiration, Bradley L. Coley, George S. Sharp (by invitation) (Read by Bradley L. Coley)

IV. GENERAL DISCUSSION

SECTION OF OBSTETRICS AND GYNECOLOGY  
Tuesday Evening, March 24, at 8:30 o'clock

ORDER

I. EXECUTIVE SESSION

Appointment of Nominating Committee

II. READING OF THE MINUTES

III. PRESENTATION OF CASES

- a. Two unusual malignant tumors of the uterus (mixed tumor), Lawrence Sophian (by invitation)  
Discussion, William P. Healy
- b. Papillary cystadenoma of the ovary with peritoneal metastases and spontaneous regression in four cases, Howard C. Taylor, Jr., Wilson E. Alsop (by invitation)  
Discussion, William P. Healy

IV. PAPERS OF THE EVENING

- a. Tuberculosis of the female genital tract, Hubert Bush (by invitation)
- b. The treatment of salpingitis, Thomas C. Peightal  
Discussion, Frederick C. Holden
- c. The use of spinal anaesthesia in gynecology, Malcolm T. Munkittrick (by invitation)  
Discussion, Abraham J. Fleischer

V. GENERAL DISCUSSION

SECTION OF LARYNGOLOGY AND RHINOLOGY  
Wednesday Evening, March 25, at 8:30 o'clock  
(Members are requested to bring their own head mirrors)

ORDER

I. EXECUTIVE SESSION

Appointment of Nominating Committee

II. READING OF THE MINUTES

III. PRESENTATION OF INSTRUMENTS

- a. 1. New lighting system for naso-pharyngoscope
2. Modified antroscope
3. Eustacheascope
4. Self angulating snare, Louis K. Pitman (by invitation)
- b. New applicators, Harry Neivert (by invitation)
- c. An improved Pomeroy syringe, Francis W. White

IV. PRESENTATION OF CASES

- a. Carcinoma of larynx—laryngo-fissure eighteen months ago, Louis Hubert
- b. Carcinoma of lung—three cases, David H. Jones

- c. 1. Sarcoma of larynx—radium treatment 21 months ago (second presentation)
- 2. Sarcoma of larynx
- 3. Double pharyngeal web associated with esophageal diverticulum, Joseph G. Strickler (by invitation)
- d. Frontal sinusitis,—negative x-ray—extradural abscess, H. G. Bullwinkel (by invitation)
- e. Mixed tumor of parotid gland, H. Griffin Bullwinkel (by invitation)
- f. Abscess of thyroid gland with perforation of trachea—operation, J. Vincent Flanagan (by invitation)
- g. Luetic nasal deformity—plastic correction in three stages, J. D. Whitham (by invitation)
- h. Retropharyngeal—esophageal abscess—operation—end result, Julius I. Klepper

From Laryngological Department, Beth Israel Hospital (service of Samuel J. Kopetzky)

- i. Laryngeal tuberculous lesions cured by the use of the Wessely irradiation machine—three cases, M. L. Harris (by invitation)
- j. Case diagnosed and operated upon for esophageal cancer, diagnosed as cardiospasm by esophagoscopy, Joseph W. Miller (by invitation)
- k. 1. Recurrent frontal sinus suppuration (right)—final operation—procedure employed—recovery
- 2. Chronic suppurative pan-sinusitis (right) with necrosis of the alveolar process and facial antral wall—operation—recovery
- 3. Chronic suppurative pan-sinusitis, complicated by chronic laryngitis simulating tuberculosis—operation via santral route—recovery, William Spielberg
- l. End results of radium treatment of inoperable tonsils—three cases J. Coleman Seal
- m. Modification of the Lautenschlaeger operation for the surgical treatment of ozena, Alfred Wachsberger (by invitation)
- n. 1. Infection of the parotid gland through the mouth
- 2. Parotid fistula following operation on the face, Arthur J. Barsky (by invitation)

#### V. PAPER OF THE EVENING

Nupercaine, the new local anesthetic, and its use in nose and throat practice, Alexander F. Laszlo (by invitation)

#### VI. GENERAL DISCUSSION

THE NEW YORK ROENTGEN SOCIETY  
*In Affiliation with*  
 THE NEW YORK ACADEMY OF MEDICINE  
 Monday Evening, March 16

#### ORDER

I. 8:30 P. M.

Demonstration of interesting cases and roentgenograms

II. 9:00 P. M.

Presented by the Cole collaborators

- a. Notes on Paget's chronic osteitis, R. W. Morse
- b. Fractures in the hand and foot; x-ray findings in a method of treatment, W. G. Cole
- c. Demonstration of a table for serial roentgenography, C. I. Headland
- d. Roentgenological demonstration of the life history of some pathological lesions, R. E. Pound
- e. Preparation and demonstration of pathological specimens, L. G. Cole

III. EXECUTIVE SESSION

ROSS GOLDEN, President

J. BENNETT EDWARDS, Secretary

NEW YORK MEETING

of the

SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE

Under the auspices of

THE NEW YORK ACADEMY OF MEDICINE

Wednesday, March 18, 1931, at 8:15 P. M.

- I. Spinal Cord Changes in Subacute Combined Degeneration Following Liver Therapy, C. Davison (introduced by E. J. Baumann)
  - II. Lesions of the Nervous System Resulting from a Deficiency of the Vitamin B Complex, H. M. Zimmerman and E. Burack (introduced by G. R. Cowgill)
  - III. The Vitamin B Complex in Relation to Food Intake During Hyperthyroidism, H. E. Himwich, W. Goldfarb and G. R. Cowgill
  - IV. Non-Toxicity of Certain Aniline Dyes for Bacteria, J. W. Churchman
  - V. Immunological Studies with Suprarenal Gland. VII. Effect of Bilateral Suprarenalectomy on Acquired Resistance in Adult Albino Rats, J. M. Gottesman and D. Perla
  - VI. Effect of Injections of Cortin on Resistance of Suprarenalectomized Rats to Histamine Poisoning, D. Perla and J. M. Gottesman
  - VII. The Cellular Reaction in Experimental Syphilis. Supravital and Fixed Material, L. Pearce and P. D. Rosahn
  - VIII. Determination of Plasma Phosphatase, A. Bodansky
- PEYTON ROUS, President
- A. J. GOLDFARB, Secretary

NEW YORK PATHOLOGICAL SOCIETY

In Affiliation with

THE NEW YORK ACADEMY OF MEDICINE

Thursday Evening, March 26, at 8:30 o'clock

ORDER

I. PRESENTATION OF CASES

- a. Carcinoma of adrenal cortical origin with unusual metastases, Charles T. Olcott

- b. A case of congenital absence of one kidney associated with urethro-rectal fistula, Lawrence W. Smith

II. PAPERS OF THE EVENING

- a. Cancer of the thyroid gland, Howard M. Clute, Boston (by invitation), Shields Warren, Boston (by invitation)

Discussion, Lawrence W. Smith, Lloyd F. Craver

- b. Pathology of a case of psittacosis with special reference to changes in spinal cord, Silik H. Polayes (by invitation)

III. EXECUTIVE SESSION

LEILA C. KNOX, President, St. Luke's Hospital

BERYL H. PAIGE, Secretary, The Babies' Hospital

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## FELLOWS ELECTED APRIL 2, 1931

Victor G. Bourke .....	Livingston Manor, N. Y.
Arthur J. Cracovaner.....	119 East 84 Street
Clarence J. D'Alton.....	123 East 53 Street
Robert T. Findlay.....	2 East 54 Street
Ella H. Fishberg.....	1212 Fifth Avenue
A. Allen Goldbloom.....	2 East 95 Street
Henry I. Goodman.....	64 East 86 Street
Harold D. Harvey.....	168 East 95 Street
Beatrice M. Kesten.....	630 West 168 Street
Homer D. Kesten.....	630 West 168 Street
Francis N. Kimball.....	21 West 11 Street
Jordan Lally .....	17 West 55 Street
Harry Neivert .....	2178 Broadway
Howard W. Potter.....	722 West 168 Street
Arthur M. Reich.....	141 West 77 Street
Robert Severance.....	25 Central Ave., Staten Island
Wendell J. Stainsby.....	400 East 29 Street
David Wexler .....	55 East 86 Street

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IN MEMORIAM  
RALPH WALDO LOBENSTINE  
1875-1931

Dr. Ralph Waldo Lobenstine, a Fellow of The New York Academy of Medicine since October 6, 1904, died in St. Luke's Hospital on March 21, 1931, at the age of fifty-six. He was the son of the late William C. Lobenstine and is survived by two brothers, two sisters, a son and a daughter.

Dr. Lobenstine was graduated from Yale College in the class of 1896 and received his medical degree from the College of Physicians and Surgeons in 1900. He served as an interne in St. Luke's Hospital and later became resident physician at Sloane Hospital for Women. Subsequently he was made attending physician at the Lying-In Hospital in the City of New York and also served as attending gynecologist to the Out-Patient Department of Bellevue for a number of years. Two years ago he was made Consulting Director of the New York Nursery and Childs Hospital.

Dr. Lobenstine's entire professional career was passed in the practice of the specialty of obstetrics and gynecology. He was a Fellow of twenty years' standing in the New York Obstetrical Society and a member of its Committee on Standards for Obstetric Hospitals. An extensive practice, developed largely through personal effort and attainments did not stand in the way of his unselfish devotion to social welfare work. His name is perhaps most prominently identified with the organization of the Maternity Center Association of New York. He was chairman of its Medical Advisory Board and likewise a member of the Directorate for many years. Dr. Lobenstine also served as a member of the Board of Consultants of the Children's Bureau in Washington and his most recent activity was concerned with the formation of a committee which had for its aims the improvement of midwife teaching and supervision.

Dr. Lobenstine was essentially a clinician, well trained in the fundamentals of obstetrics and practiced his profession with great success. Notwithstanding this he always manifested an unselfish interest in social welfare work and stands out in the ranks of those who give largely of their time and energy to the accomplishment of the highest ideals in our profession.

G. W. K.

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### DEATHS OF FELLOWS OF THE ACADEMY

JAMES FRANCIS GRATTAN, 30 West 59 Street, New York City; graduated in medicine from the College of Physicians and Surgeons, New York City, in 1913; elected a Fellow of the Academy January 2, 1930; died, March 25, 1931. Dr. Grattan was a Fellow of the American Medical Association, a member of the County and State Medical Societies, Director of Plastic Surgery to Municipal Hospitals of the city, and Consulting Plastic Surgeon to Kings County Hospital.

FREDERICK TALMADGE LAU, M.D., 17 East 38 Street, New York City; graduated in medicine from Detroit College of Medicine and Surgery, in 1913; elected a Fellow of the Academy February 3, 1921; died, March 24, 1931. Dr. Lau was a Fellow of the American Medical Association, a Fellow of the American College of Surgeons, a member of the County and State Medical Societies, a member of the American Urological Society, a member of the Urological Society, Associate Surgeon to City Hospital, Urologist to New York and Ruptured and Crippled Hospitals, Surgeon and Director of Genito-Urinary Surgery to Grasslands Hospital, Valhalla, New York, Consulting Urologist to White Plains Hospital, White Plains, N. Y. and Matteawan Hospital, Matteawan, N. Y., chief of the Urological Clinic to City Hospital and Chief of the Female Clinic to New York Hospital.

RALPH WALDO LOBENSTINE, M.D., 119 East 74 Street, New York City; graduated in medicine from the College of Physicians and Surgeons, New York City, in 1900; elected a Fellow of the Academy October 6, 1904; died, March 21, 1931. Dr. Lobenstine was a Fellow of the American Medical Association, a Fellow of the American College of Surgeons, a member of the County and State Medical Societies, a member of the Society of Alumni of St. Luke's and Sloane Hospitals, and Obstetrician and Consulting Director of Obstetrics to New York Nursery and Child's Hospital.

GEORGE SCOTT, M.D., 9 South Pennsylvania Avenue, Atlantic City, New Jersey; graduated in medicine from Bellevue Hospital Medical College, New York City, in 1871; elected a Fellow of the Academy March 6, 1884; died, March 27, 1931.

# DATES OF ACADEMY MEETINGS

## STATED MEETINGS

1st and 3rd Thursdays.

## SECTION MEETINGS

Dermatology and Syphilology, 1st Tuesday.

Surgery, 1st Friday.

Neurology and Psychiatry, 2nd Tuesday.

Historical and Cultural Medicine, 2nd Wednesday of November, January, March and May.

Pediatrics, 2nd Thursday.

Otology, 2nd Friday.

Ophthalmology, 3rd Monday.

Medicine, 3rd Tuesday.

Genito-Urinary Surgery, 3rd Wednesday.

Orthopedic Surgery, 3rd Friday.

Obstetrics and Gynecology, 4th Tuesday.

Laryngology and Rhinology, 4th Wednesday.

## TRUSTEES, COUNCIL AND COMMITTEE MEETINGS

Trustees, 4th Wednesday.

Council, 4th Wednesday.

Committee on Admission, 1st Wednesday.

Committee on Library, 2nd Tuesday.

Public Health Relations Committee, Mondays.

Committee on Medical Education, 2nd Thursday.

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## DONATIONS TO THE LIBRARY FUNDS

Donations and bequests are solicited by The New York Academy of Medicine for the maintenance and expansion of the Library.

A donation or bequest of \$5,000 or more will provide for a special library fund, the income of which may be used for the general purposes of the Library or restricted to the purchase of books and periodicals, as the donor or testator may indicate.

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## FORM OF BEQUESTS

The following is a brief legal form as a suggestion under which bequests may be made in behalf of the Academy:

I give, devise and bequeath unto "The New York Academy of Medicine" of the City of New York, State of New York, a corporation duly incorporated by the Legislature of the State of New York by an act entitled, "An Act to Incorporate The New York Academy of Medicine," passed June 23, 1851, and amended June 4, 1853, June 2, 1877, and April 25, 1924, . . .

# BULLETIN OF THE NEW YORK ACADEMY OF MEDICINE

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## ANNUAL GRADUATE FORTNIGHT BACTERIOPHAGE AS A TREATMENT IN ACUTE MEDICAL AND SURGICAL INFECTIONS\*

F. d'HERELLE

Professor of Bacteriology,  
Yale University School of Medicine

Bacon has said "To rule nature man must obey her" and, although this aphorism applies to all science, it is the biologist especially who must always keep this statement in mind. In the physical sciences the investigator is largely without the power of choice, he must obey natural laws. A competent astronomer or an able physicist cannot conduct bad experiments. A physical problem can always be expressed by an equation where all of the terms are real. This is not true for the biologist and for the immunologist in particular. A great many believe, and among them the most experienced, that just as soon as one has made an experiment one is upon the solid ground of experimental science which can not be false. Unfortunately this is not true. The biologist may choose the factors which enter into the equation of each of the problems confronting him. If he disobeys the laws of nature, that is to say, if he adopts unreal conditions, all of the results to which these will lead will be unreal and purely imaginary. It is only when operating under natural conditions that he may hope to find the true solution, and through this be placed in a position to command nature.

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\*Delivered October 28, 1930.

Let us consider a particular case—that of the phenomenon of recovery from infectious disease. We know, through common experience, that certain species of animals are completely refractory to certain diseases which decimate other species. No one has ever seen, for example, in the course of the most terrible epidemic, a single rabbit contract cholera or a single guinea pig contract typhoid, although men were dying by thousands. The guinea pig and the rabbit, as indeed are all other animals, are refractory to these two diseases. They enjoy a natural immunity.

We know, likewise, by common experience, that a great many of the infectious diseases do not recur or, at least, recur but rarely. It is unusual for a man who has recovered from an attack of typhoid, for example, to contract this disease a second time. A first attack of an immunizing disease leads, therefore, within the individual, to the appearance of a new character. He enjoys an acquired immunity. This immunity, very strong at the beginning, gradually diminishes at a rate more or less rapid in accordance with the disease causing it. In certain cases it disappears completely after a greater or less length of time.

There is, in addition, a third type of immunity. In certain of the chronic diseases such as tuberculosis or syphilis it is very evident that the patient does not enjoy an acquired immunity since the pathogenic organisms continue to develop within the lesions, but he possesses, nevertheless, a new character for reinfection can not occur as long as he remains the carrier of the specific germs. This immunity, certainly different from acquired immunity since it ceases at the moment when the specific organism disappears from the lesion, may be termed pathogenic immunity or, better, symbiotic immunity.

It is only natural a priori to consider the phenomenon of recovery as being within the limits of immunity, but this has yet to be experimentally proved. It is somewhat curious to note that this question of recovery in infectious diseases, a question which would seem fundamental, has always been passed over in silence. Everyone has implicitly

admitted that recovery was a natural consequence of the acquisition of immunity. The reason for this conclusion can readily be understood for all present day immunology is founded upon laboratory experiments carried out with guinea pigs and with rabbits. These animals have been inoculated with cultures of different bacteria, cholera vibrios, typhoid bacilli and others for which these animals possess an absolute natural resistance. In them there have been produced artificial infections which bear no relationship with natural diseases. It is in this way that nature has been disobeyed for such studies can only lead to an imaginary solution. Today immunology is but a pseudo-experimental science.

In so far as recovery is concerned, a simple observation of the facts suggests the hypothesis that this phenomenon can not be the consequence of an acquired immunity. As a matter of fact all of the infectious diseases are not immunizing. Not to mention the pyogenic infections—it is certain that bacillary dysentery can recur at frequent intervals and that the relapses are often as serious, if not more serious, than the initial attack. As for cholera, it is not rare to see recurrences, and all authors of the nineteenth century who have witnessed epidemics in Europe have been unanimous in considering cholera as a non-immunizing disease. On the other hand, with those diseases which are actually immunizing, if recovery results from the acquisition of immunity, how are we to explain satisfactorily the relapses which take place during convalescence, at the moment when the immunity should be at its maximum potency?

These observations suggest the hypothesis that recovery can take place without the phenomena of immunity intervening, and that acquired immunity must be a delayed result of the recovery. In order to verify this hypothesis suggested by observation, it is necessary naturally to study that which takes place within the patient at the moment of recovery, and to do this by adopting an experimental method which conforms to the principle of obeying nature.

It is necessary to study the man or the animal afflicted with natural disease to see the phenomena which take place within him at the time of recovery and throughout the course of convalescence. This method is the only one which can provide a true solution to the problem.

From the beginning of my study of bacteriophagy I have been struck by the fact that the appearance within the body of the patient of the principle which leads to bacteriophagy coincides with the time when the symptoms ameliorate. Absent during the disease, bacteriophage appears constantly in convalescents. Bacteriophagy is thus contemporaneous with recovery. In vitro bacteriophagy consists of the following:

Let us take a few drops of stool derived from a convalescent from bacillary dysentery. Let us emulsify this in about 20 c.c. of sterile bouillon and filter it through a porous porcelain filter, such as the Chamberland, or through a silica candle such as the Berkefeld. Let us add to a young bouillon culture of the dysentery bacillus a drop of this filtrate, and place the tube in the incubator. At first the bouillon appears cloudy, but after a few hours we note that it becomes more and more clear, and, finally after about 12 hours, sometimes more quickly, it becomes perfectly limpid. At this time all of the bacilli are dissolved.

Let us take, then, a new, fresh culture of dysentery bacilli and add to it a drop of the limpid fluid which remains after the disappearance of the bacilli from the first mixture. Let us place this second tube in the incubator. We will find that the phenomenon repeats itself, for after a few hours all of the bacilli are again dissolved and the liquid is clear. We may then remove a drop of the second dissolved culture and introduce it into a third culture of dysentery bacilli. Once more the phenomenon of dissolution takes place.

One might in this manner continue the passages indefinitely, introducing into each new, fresh culture of dysen-

tery bacilli a drop of the preceding one after all of the bacilli have been dissolved. Far from diminishing in intensity in proportion to the degree of dilution of the initial drop of filtrate the phenomenon becomes, on the contrary, more intense. Thus it is that after more than a thousand successive passages I have been able to obtain the complete dissolution of the 2,000 million bacilli contained in 10 c.c. of bouillon, by adding the infinitesimal quantity of a billionth of a cubic centimeter of the preceding dissolved culture.

Such experiments demonstrate that the principle which destroys the bacteria, and to which I have given the name "Bacteriophage," reproduces itself in the course of its action. The phenomenon of bacteriophagy consists essentially, then, in a dissolution of bacteria under the influence of a principle which reproduces; the latter phenomenon, that is, reproduction, being directly related to the bacteria which are dissolved.

Various questions now arise. Is this bacteriophage found only by chance in the intestinal tract of certain dysentery patients, or is it a constant phenomenon? We will return to this question later. Is the phenomenon of bacteriophagy limited to the dysentery bacillus? I have been able to establish the fact that bacteriophagy is a general phenomenon. It has been possible to isolate races of bacteriophage leading to the dissolution of bacteria belonging to very varied species, such as *Eberthella dysenteriae*, *paradysenteriae*, *typhi*, *paratyphi*, and *sanguinaria*; *Escherichia coli*; *Salmonella schotmülleri*, *pullora*, *suipestifer*, and *typhi-murium*; *Proteus vulgaris*; *Vibrio comma*; *Pasteurella pestis*, and *bovis*; *Cornybacterium diphtheriac*; and *B. subtilis*. Other investigators have isolated bacteriophage races active with staphylococci, streptococci, and pneumococci, and even with bacteria parasitic of plants, such as *Rhizobium radicicolum*, *B. tumefaciens*, and *B. carotovorus*. The diversity of the bacteria attacked warrants the belief that the phenomenon is, indeed, general, perhaps involving all bacteria.



Various experiments show that the bacteriophage exists in corpuscular form. One such experiment, the most simple, consists in adding to 10 c.c. of a well-grown bacterial culture an infinitesimal trace, a billionth of a cubic centimeter, of a filtrate containing active bacteriophage. If a drop of this culture is spread immediately on agar we will obtain, after incubation, a growth of bacterial culture over the surface of the media, and this will be spotted with circular bare areas which appear to be perfectly sterile and are visible to the naked eye. Each of these plaques represents a colony of bacteriophage made up of millions of corpuscles, all the issue of a single corpuscle deposited on the agar at the time of spreading. Each corpuscle has commenced to multiply at the expense of the neighboring bacteria. The destruction of the bacteria and the simultaneous multiplication of bacteriophage corpuscles is so active that after a few hours the area of destruction is so wide as to be visible to the unaided eye.

For lack of time I will not discuss all of the characteristics of the bacteriophage phenomenon for it is in reality extremely complex. I will restrict myself to some of the essential ideas. The bacteriophage corpuscle is a living, ultramicroscopic being as is proved by the fact that this corpuscle dissolves bacteria through the agency of a ferment which it secretes. The secretion of a ferment implies a metabolism and this is an essential character of living beings. A bacteriophage is, therefore, of necessity a virus, a parasite of bacteria.

In its action each bacteriophage is not specific, for a given bacteriophage may parasitize and dissolve bacteria belonging to different species, sometimes as unrelated as the streptococcus and the colon bacillus or even the plague bacillus and *B. typhosus*. The characters of each strain of bacteriophage are variable. There are races of bacteriophage able to attack many species of bacteria, others which attack but a single species or even but a single bacterial strain. Certain of them are so potent that they are able in vitro to destroy and to dissolve within less than two hours

all of the bacteria contained in a culture, while others exercise but a scarcely perceptible, partial action.

Adaptability is an exclusive property of living beings and the bacteriophage possesses this character to a very high degree. There are, however, in this respect differences between different races for certain bacteriophages adapt themselves very readily, while others do so very slowly. In so far as the present discussion is concerned, the most important character of adaptability is represented by the faculty which each strain of bacteriophage possesses of adapting itself to the parasitism of new bacterial species which heretofore were not attacked. This experiment of adaptation can even be effected *in vitro*. It is possible, for example, to adapt a bacteriophage which originally, at the time of isolation, was active only upon *B. coli* to the parasitism of *B. typhosus*. This property of adaptation is rapidly lost in races of bacteriophage maintained under laboratory conditions.

There is another important consideration. When attacked by a powerful bacteriophage the bacterium succumbs, but if the potency of the bacteriophage is less the bacterium is capable of resistance, in which case it then contracts a true chronic disease accompanied by profound modifications in its characters. With regard to the subject now under discussion the most important of these modifications involves the variation in bacterial virulence, and this is usually attenuated and may completely disappear.

In brief, these are the principal characters of the very complex phenomenon of bacteriophagy.

We have seen that the principle which causes bacteriophagy can be uniformly isolated from the convalescent, and we are able to conclude that bacteriophagy *in vivo* is contemporaneous with recovery. Is it the cause?

In the first place let us state that the bacteriophage virus does not appear spontaneously at the moment of recovery. Experiment demonstrates that the bacteriophage exists in the intestinal content of all healthy individuals where it

grows at the expense of the saprophytic bacteria, of *B. coli* in particular, which are daily ingested with the food. Thanks to its faculty of adaptation, the normal intestinal bacteriophage becomes able to parasitize foreign bacteria which may become implanted, not only within the intestines but in any organ whatsoever, for experiment shows that the bacteriophage passes readily into the circulation.

In order to prove if the bacteriophage is really the cause of a recovery it is only necessary to study patients affected with acute infectious diseases from the beginning of the disease up until the end of convalescence. This is what I have done for various human and animal diseases. Here is, in summary, what I have observed. The condition of the patient depends upon the behavior of the bacteriophage and recovery takes place only when the destroying potency of the bacteriophage reaches an intensity sufficient to lead to the bacteriophagy of the pathogenic bacteria.

I am not able, for lack of time, to describe the many studies which I have made upon this subject during different epidemics in Europe, in Indo-China, and in India. Here are, as an example, the results of the studies made upon cholera. These results are expressed in the form of curves, with the solid line representing the severity of the disease as determined by the different symptoms; 10 represents the maximum severity where all of the symptoms are present to the highest degree, 0 indicates the absence of symptoms, that is, recovery. The dotted line presents the curve of potency of the bacteriophage isolated from the patient at the same time in its action upon the cholera vibrio. Between 10 and 6 on the scale tests of potency in vitro show that there is a complete bacteriophagy in a time varying from 21½ hours (10) to 12 hours (6), below 6 the bacteriophagy is only partial, becoming less as the coefficient drops; 0 represents no activity upon the cholera vibrio.

As may be seen from these curves, not only is the phenomenon of recovery strictly related to the behavior of the bacteriophage, but the condition of the patient at a given

moment is always a function of the activity of the bacteriophage. If bacteriophagy does not take place the patient dies.

In bacillary dysentery, in typhoid and the paratyphoid fevers, in different animal septicemias, and in human and murine plague the examination of patients reveals the same relationship between recovery and bacteriophagy *in vivo*.

It is necessary, however, to emphasize the fact that the phenomenon of bacteriophagy *in vivo* is far more complex than that occurring *in vitro*. In the latter case only two beings are involved, the bacterium and its parasite, the bacteriophage. *In vivo* a third factor enters; the host. In my first book on bacteriophage published in 1921, I described experiments which tend to show that opsonins are in reality the lysins secreted by the bacteriophage corpuscles during bacteriophagy. Let us take two tubes containing like mixtures of sensitive bacteria and leukocytes and let us add to one of these tubes a suspension of bacteriophage or a solution of lysin freed from bacteriophage corpuscles. We will find that phagocytosis is from five to fifty times more active in the presence of the lysin than it is in the control tube. The opsonic power of bacteriophage has since been confirmed by various investigators, including Gohs and Jacobsen, Weiss and Arnold, Nelson, and Smith.

Thus opsonic action tends naturally to prevent the formation of secondary cultures which are so frequent *in vitro*, but even though these may be formed, a third phenomenon intervenes which also depends entirely upon the bacteriophage. I have stated above that bacteria which resist the action of bacteriophage undergo modifications in their characters and principally in that of their virulence, which generally becomes attenuated and often disappears completely. This it is easy to prove experimentally.

Three distinct phenomena, therefore, take place *in vivo*. Bacteriophagy itself, a powerful opsonic action, and an at-

tenuation in the virulence of the pathogenic bacteria. These three phenomena are induced by bacteriophage and all three contribute toward recovery.

All these studies tend therefore to show that recovery is in no way derived from a phenomenon of immunity as had been believed up to the present time, but rather that it is a direct result of bacteriophage *in vivo*. It is, furthermore, easy to prove this conclusion for it may be done by means of crossed experiments. It is possible, easy indeed, to introduce into a culture of the pathogenic bacterium a trace of a suspension of a virulent bacteriophage, the bacteria are attacked and destroyed, and meanwhile the bacteriophage multiplies. That which was at the beginning a culture of bacteria becomes, after a few hours, a culture of bacteriophage. Let us give a patient by mouth, at the onset of symptoms, a few drops of this culture of bacteriophage. Bacteriophagy must take place *in vivo* and recovery must follow. The patient will not be forced to take the chance of his own intestinal bacteriophage undergoing an adaptation, for we can inaugurate at the beginning of the disease, the natural processes of recovery.

I will state briefly what has been done up to the present time in this direction. From 1919 on I have made experiments upon patients affected with bacillary dysentery, causing each patient to ingest two cubic centimeters of a culture of bacteriophage having a high virulence for dysentery bacilli. In all cases, without exception, all of the morbid symptoms disappeared within a few hours, in from four to twenty according to the case, and the next day the patient was definitely convalescent. Since that time this method of treatment has been applied on a large scale, principally in the Soudan and in Brazil.

In Brazil, as the result of control experiments conducted by da Costa Cruz, who obtained results identical with those which I had reported, the Oswalde Cruz Institute of the Brazilian Government has prepared, since 1924, cultures of a highly virulent bacteriophage for the dysentery bacilli. These have been placed in two cubic centimeter ampules

and distributed to hospitals, to government health officers, and to all physicians who have requested them. This mode of treatment has quickly supplanted all others, including the use of antidysenteric serum, which has been abandoned. The results obtained in the first 10,000 cases have been published and only two failures are recorded.

As for the Soudan, this phrase, summarizing the results, appears in a letter of the Director of the Medical Service. "The results of treatment of bacillary dysentery with it have been little short of miraculous." A single failure, the case of an infant already moribund when brought into the hospital, occurred among several hundred cases treated.

In the year 1927 while in India, as the result of the experiments of which I have spoken, I attempted the treatment of Asiatic cholera. These attempts at therapy were made in the Punjab, on the natives cared for in their homes and to whom no other medication was given. Each patient received an initial dose of two cubic centimeters of a virulent bacteriophage, and with the family a second dose of four cubic centimeters diluted in one hundred cubic centimeters of water was left with instructions to give it to the patient by spoonfuls during the three or four hours following. I should state that I merely furnished the cultures of bacteriophage, treatment was carried out by Major Malone of the Indian Medical Service, assisted by the other officers of the Service. As it was impossible to enforce any one mode of treatment, the family of the patient was free to accept or refuse it, in the latter case usually resorting to the prescriptions of the Hindoo medicine man. The majority of the patients for whom authorization was granted were found in a critical state; indeed, it was only because of this that parents, despairing of saving them, accepted the new treatment. As a control series we have taken those cases in which the bacteriophage treatment was refused. In spite of these extremely unfavorable conditions the mortality in the controls was 62.9 per cent, and among those treated with bacteriophage 8.1 per cent.

Since then Colonel Morison of the Indian Medical Ser-

vice has applied the same mode of treatment in epidemics of cholera in Assam and working also in the villages he has obtained comparable results, the mortality varying from 8 to 11 per cent among the treated while the mortality among those not treated by bacteriophage varied from 60 to more than 80 per cent according to the epidemic.

Asheshov has treated patients in the hospital by applying bacteriophage treatment by the intravenous route and he has succeeded in lowering the mortality to about 2 per cent.

Let us pass to another disease which has a high mortality and which has furnished the most striking results. In 1926 while in Egypt I treated four cases of bubonic plague by injection of the bacteriophage into the buboes; all four of the patients recovered.

In the course of an epidemic which occurred in Senegal, Dr. Couvy, Director of the School of Medicine at Dakar, faced with the non-effectiveness of antiplague serum in severe cases of the disease, attempted the treatment by bacteriophage, utilizing a strain isolated from a convalescent. In order to ascertain in a definite manner the value of this treatment he applied it solely to cases of extreme severity in whom death seemed to be certain within a short time. "Either they appeared moribund after failure of the serum treatment, or it was given at once to patients whose condition appeared desperate" as he states in his paper. Among such patients the mortality is practically one hundred per cent, but with bacteriophage treatment he obtained 15 recoveries among the 21 cases treated. In the course of this epidemic 8 cases of septicemic plague were treated by serum before the trial of bacteriophage. All of these died. Two cases treated by bacteriophage recovered in spite of the fact that the bacilli were so abundant in the blood that they could be disclosed by direct microscopic examination. Of nine cases of pneumonic plague treated by serum all died (as is well known, pneumonic plague is without exception fatal) while one case treated with bacteriophage recovered.

"The action of bacteriophage" states Convy "manifests itself by an abrupt fall in the temperature, often the defervescence is violent, a fall of several degrees. The general condition rapidly improves. The antitoxic action is most sharp and the hallucinations quickly give place to calm. The periadenitis disappears, the buboes regress, and convalescence takes place within a few days. One never sees the interminable suppurations so frequent with other methods of treatment. There is no necrosis or gangrene."

Let us state in passing that the antitoxic action manifested so quickly and effectively by the bacteriophage is absolutely clear cut, although it is difficult to explain in the present state of our knowledge. I have observed it not only in plague but in other toxic diseases which I have treated with bacteriophage, cholera and bacillary dysentery among others.

Let us pass on to other diseases having a high mortality. We know that recovery is rare in staphylococcus septicemia, the mortality being about 90 per cent. In 1929, at my suggestion, Dr. Daviond treated a hopeless case in the following manner. Five cubic centimeters of a suspension of staphylococcus bacteriophage was diluted in 500 c.c. of physiological saline. This was all introduced intravenously, the period of injection occupying about one hour. This is, indeed, the technic which I have recommended for all intravenous injections of bacteriophage, and it is possible to inject in this manner without danger of immediate shock as much as 25 c.c. of a suspension of bacteriophage. Two hours after the injection there occurred a strong thermic reaction with chills. Upon the morning of the next day the temperature was normal and convalescence began. Eight days later the patient left the hospital, recovered. When seen ten months later she had enjoyed perfect health. Since then many other cases of staphylococcus septicemia have been treated in the same manner in the hospitals of Paris with a like degree of success.

Dutton, the first I believe, has treated with success cases of streptococcus septicemia, and Raiga has very recently



treated this condition. Since here defervescence has not taken place as quickly after the injection as in the preceding cases, upon my advice he made a series of ten intramuscular injections of 5 c.c. each with an interval of 20 hours between each injection. Here is an example. A woman of 28 years, with a puerperal infection was treated simultaneously with septicemine, pyoformine, immunotransfusion, fixation abscesses, and antistreptococcus serum. On the third of July, confronted with the failure of all these methods and by the fact that the patient was gravely ill, the physician in charge requested Dr. Raiga to apply bacteriophage. The temperature was then  $41^{\circ}$  C. He gave an intravenous injection of 10 c.c. of streptobacteriophage diluted in 500 c.c. of physiological saline. No reaction followed. In spite of the fact that the temperature continued during the following day to vary between  $40$  and  $41^{\circ}$  and the blood cultures remained positive, the condition of the patient improved and the appetite returned. Since two injections of antistreptococcus serum had been made in the two flanks there had developed in these regions a diffuse ligneous phlegmon. On the right the infiltration had progressed toward the anterior region of the thigh and had assumed the appearance of a gangrenous phlegmon. Purulent fistulae extended to the knee. On the 18th of July a series of 10 daily intramuscular injections of 5 c.c. of streptococcus bacteriophage were commenced. On the 23rd of July the slough was removed. Upon the 31st of July the blood culture became negative and the temperature progressively lower. The patient left the hospital, cured, on the 31st of August.

Let us turn to still another type of disease—typhoid fever. Since 1923 many papers have appeared upon the subject of its treatment by bacteriophage. Some of them (Hauduroy, Alessandrini, and Doria among others) reported excellent results, while with others (Wolff, for example) the results were negative. I believe, however, that I have recently discovered the cause of these differences. I will speak of them shortly when I consider the general conditions governing treatment by bacteriophage.

For two years I have studied this question and have made experiments in many centers in France. One experiment involving about 150 cases shows that if one administers by mouth a suspension of bacteriophage (I have used a mixture containing many strains of typhoid bacteriophage and several strains of coli bacteriophage) in a dose of 2 c.c. repeated every four hours, one does not obtain a cure in the strict sense of the word, but the disease develops in the form of a simple fever without complications. The stools are formed and normal, the patient does not complain of any disturbance and regains his appetite. None of these cases have died.

On the other hand, when one applies bacteriophage by the intravenous route in the manner indicated above one induces in about half of these cases a strong thermic reaction with chills followed by a rapid fall in the temperature which reaches normal in 48 hours. In the other half of the cases no reaction takes place and the disease follows its normal course.

In view of these remarks, and it is in this direction that I intend to continue my studies, it would seem that an intravenous injection of typhoid bacteriophage might be given, continuing the treatment in the cases where the salutary reaction does not take place, either by administration by mouth as in the first series of cases mentioned, or by serial intramuscular injections such as those used in the streptococci septicemias.

In infantile diarrheas I have applied treatment by bacteriophage in several hundred cases, using a mixture containing a large number of races of bacteriophage active upon the different pathogenic bacilli which may be found in the intestines of patients—dysentery bacilli of the Flexner or Hiss types, Morgan bacilli, and *B. proteus*. Bacteriophage is administered by mouth in doses of 2 c.c., this being repeated every two hours until the stools have become normal. The effect is usually very prompt and in more than 80 per cent of the cases recovery is obtained within 24 hours. The results would certainly be still much

more favorable if new strains of bacteriophage were added, for it seems that infantile diarrhea is not a definite entity from the standpoint of etiology, but that it may be caused by bacteria of various types. By using a mixture containing bacteriophage capable of acting upon all of those bacteria which cause infantile diarrhea one might hope to be successful in 100 per cent of cases. This appears the more probable, since I have found that the efficiency of the treatment increases as new races of bacteriophage are added to the preparation used for the treatment of this disease.

I will only mention here the treatment of urinary infections due to colon bacilli, for a great many authors have studied this problem and have published their results. It may be said that in acute infections prompt recovery is the rule following intravesicular injections of coli bacteriophage active for the colon bacillus causing the disease. It must also be said that recovery is the rule in these infections whatever the treatment employed. In chronic cases a review of the results indicates that about 60 per cent of the cases recover when treated by instillation into the bladder in conjunction with a series of subcutaneous or intramuscular injections. This figure is raised to about 85 per cent if the instillations are made, not into the bladder, but into the pelvis of the kidney involved. It should be added that it has not yet been possible to isolate strains of bacteriophage acting upon all the cultures of coli which may be found in chronic cases. In a given case of chronic infection caused by this organism it is first essential to determine whether the bacillus of the patient is attacked by a stock bacteriophage. If it is not, it is essential to utilize an "autobacteriophage." This difficulty is not present in other diseases, for with the exception of *B. coli* races, we now possess strains of bacteriophage which are polyvalent.

Bacteriophage treatment of staphylococcus infections has been very extensively applied. Since the general principle of the method consists in placing the bacteriophage in as intimate a contact as is possible with the pathogenic

bacterium it is essential in staphylococcus infections to inject directly into the focus. Since such injections may often be very painful one may, as Jaquemaire has shown, mix with the staphylobacteriophage a quantity of a suitable anesthetic, novocaine for example. This treatment has up to the present been applied in thousands of cases. For example, Raiga alone has reported the results of this treatment on more than 1,000 different cases, Churman Rices 300 cases. The series of Larkum is very large, and Halphen has used the treatment in 600 cases of tonsillar abscesses, etc. Other types of staphylococcus infection have been treated with equal success, such as furunculosis, carbuncles, paronychia, abscesses of all kinds, of the gums, of the breast, and rectal abscesses. It has been used in phlegmons, in infected wounds, and in osteomyelitis. All investigators who have used this mode of treatment in these different infections are unanimous in stating that the results obtained are far superior to those secured with other methods. This is especially true as regards the rapidity of the action and the absence of scars, which of course are very significant in connection with lesions of the face. One interesting fact recorded by several authors and which I have observed upon several occasions is that very quickly after the first injection of bacteriophage into the pyogenic focus the painfulness disappears completely. The patient who, prior to the intervention, was continually moaning, after one or two hours experienced a sensation of euphoria. This action is especially striking in the case of certain very painful abscesses, those involving the anal region for example. This is not a specific action in particular patients, but is a general effect.

One other type of infection should be mentioned briefly, that is, the treatment of chronic bronchitis, of angina, and of coryza by means of a mixture of different races of bacteriophage active for those organisms which may be isolated from the throat in these conditions. The bacteriophage is here applied by spraying the nose and the throat. I have seen the results in about 300 cases of these different conditions treated in this way and in from 60 to 70 per

cent recovery was rapid. As is the case for other diseases in which the specific germ varies, the results would certainly be improved with the addition of new strains of bacteriophage to the stock.

I must end this lecture in which, for lack of time, I have been forced merely to cite facts without entering into the details of each particular case, with a few general considerations.

Treatment by bacteriophage has been, I believe, demonstrated to be the specific treatment *par excellence*, since it leads to recovery through a mechanism identical with that of natural recovery. Because of its nature one may hope to obtain results only when the bacteriophage administered is endowed with a maximum potency against the pathogenic organism involved. As we have seen, it is possible to isolate very powerful races of bacteriophage, other races are less active and in some the action is very weak indeed. Any attempt at treatment with any type of bacteriophage of low potency is to court a certain defeat. The *sine qua non* of success is the utilization of bacteriophage races selected with care.

I would add a second statement, one which is equally important. I have recently discovered that the therapeutic effect of a bacteriophage is the stronger the more recently the bacteriophage has been isolated. After a series of cultures in the laboratory, and although in vitro the virulence of the bacteriophage is maintained intact, it loses more or less quickly its power of acting in vivo. Preliminary studies already indicate that this attenuation of in vivo action is due to the fact that gradually, as cultivation continues, the bacteriophage loses the faculty of adaptation. In plague, for example, this attenuating behavior is so marked that after four or five laboratory passages the bacteriophage has lost all therapeutic action. Nevertheless, this same race, tested in vitro, shows no weakening in its ability to attack plague bacilli. The same facts have been noted in cholera, and it is probably true also for typhoid fever. With the staphylococcus bacteriophage, on

the contrary, it would seem that the therapeutic action may be maintained for a very long time through passages *in vitro*. This attenuation of action *in vivo* is caused by the passages *in vitro*, and is not due to the period of preservation, for a bacteriophage which has undergone but two or three of these passages and is then preserved in sealed ampules retains its properties intact for many months or even for several years.

A third observation may be made. Whatever the disease under consideration the bacteriophage must be administered in such a way that it can quickly come into contact within the body with the bacteria which it is designed to destroy. This condition can always be readily met, since one has only to select the mode of administration suited to each particular case. The question of posology is of no very great importance, since the bacteriophage commences to multiply just as soon as it comes into contact with susceptible bacteria. Theoretically a billionth of a drop should suffice provided the bacteriophage corpuscles are placed in contact with the bacteria which they are to destroy. *In vitro* this fact is readily demonstrated, but it is not the same *in vivo*. However, since the bacteriophage has no action upon the cells of the body and since, as a result of this, it is possible to administer an unlimited quantity without inconvenience to the patient, even if the diagnosis is erroneous, and since it is always desirable to induce a rapid destruction of the pathogenic bacteria, it is in general wise to administer reasonably large doses. In relation to this subject I might state that as a result of laboratory experiments which have been poorly interpreted I have recommended that intramuscular or subcutaneous injections be not repeated. Subsequent experiments have shown that such a statement was not justified and that it is often possible to administer a series of ten or fifteen large doses, that is 5 to 10 c.c. without causing any inconvenience for the patient.

If I may now make a final recommendation, I would say that bacteriophage destined for therapeutic usage should

be prepared in accordance with a proved technic. It should not contain bacteria and it is, indeed, easy to demonstrate whether this condition is fulfilled. Suspensions of bacteriophage are perfectly clear despite the fact that billions of bacteriophage corpuscles are present. The slightest turbidity in an ampule indicates a certain contamination and such material should not be used.

Bacteriophage therapy is still in its infancy and many studies are still necessary before we will learn all the results that we may anticipate, but that which has already been done in many diseases justifies the belief that this is the specific treatment *par excellence* and that it will attain a wider and wider application.

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# INFECTIONS OF SKIN AND THE SUBCUTANEOUS TISSUE\*

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## INTRODUCTION

It is with considerable hesitancy that I speak to you this evening on the subject which the chairman has given you; because it is a subject with which every one is familiar and includes conditions which every general practitioner is constantly meeting in his day's work and in which from the earliest stages of his practice, he has had a wealth of experience. Upon every phase of it, all of you will probably have very decided opinions. I feel therefore, that my paper will serve to open a discussion in your minds rather than to present dogmatic opinions. The scope of the topic given to me by Dr. Reynolds makes it necessary for me to cover a fairly wide field but I shall try to deal with general principles rather than with specific details; and these general principles I present from my own personal experience and reflections, from my observations of the methods of other members of the surgical staffs to which I have belonged, and from the experiences of others which have been reported in the literature.

Although the subject of my paper might lead one to expect some treatment of the dermatological features of skin infections, I propose to limit my remarks to the surgical aspects. The acute inflammations of the skin are so often linked up with the deeper invasion of bacteria either into the subcutaneous tissues or into the general circulation that they are generally considered surgical problems, whereas chronic lesions are more apt to be limited to the

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skin itself and are amenable to non-operative therapy. In many instances these cases are trivial and respond to almost any method of treatment, but at times they go from bad to worse in spite of anything the doctor tries to do. They usually take a great deal of his time and attention. He very often considers them a plagued nuisance, requiring his time and attention out of all proportion to the return which they give him, either in professional experience, or in the appreciation of the patients, or in the monetary recompense.

### ANATOMY

I should like to call to your attention first of all, certain features of the anatomy of the skin as well as the tissues just beneath the skin which are necessary for the understanding of the development and progress of these acute infections, for the anatomy as well as the physiology of the skin affects in no small measure the course of events. The body is covered with an epithelial coat varying in thickness to a considerable degree according to the exposure of the parts, the use to which they are subjected and to the normal movements of the underlying structures. In general those parts which are more exposed to trauma are thick, and those which are more protected are thin. Beside the main creases of the skin, which in general correspond to the bending of the various joints of the body, there are myriads of smaller wrinkles which are apparent with slighter motions. In the depths of these wrinkles the epithelial coat is thin and in these creases bacteria may lodge. The upper layers of the skin are hornified, being made up of dried cells which have gradually been pushed to the surface by the multiplication of living cells in the basal layer of the epidermis. As the cells of the basal layer multiply the more superficial layers are carried farther and farther away from their food supply which comes by way of the intercellular channels in the deeper layers of the epidermis. This outer layer of dead cells offers a very strong barrier to the entrance of microorganisms and if it were not broken by the frequent exit of small

ducts or perforated by hairs it would probably be a much more efficient barrier to infection than it is. In these ducts, however, and in the hair follicles, and in the sebaceous glands which discharge into the hair follicles and in the finer skin crevasses, the bacteria with which the body comes in contact, as it moves about from place to place, may lodge. The chief points to remember with regard to the physiology of the skin are that it is a flexible, elastic, mechanical barrier anointed by the secretion of the sweat and sebaceous glands, and that its blood vessels dilate and contract in response to vasomotor stimuli and in response to the application of heat or cold. These points all play prominent rôles in the process of infection.

Let us now consider the anatomical features of the tissues beneath the skin, which modify the course of an infection. Over most of the body, the subcutaneous tissues consist in a layer of fat and areolar tissue overlying deep fascia and muscle. In certain parts, however, the skin immediately overlies bones, tendon-sheaths and fascial compartments. The most important of these are in the hand and it is of utmost necessity for the surgeon who essays to treat hand infections to know in detail these anatomical structures. Otherwise he will certainly make mistakes which will result in irreparable damage to his patient. Even those who know this region of the body well, find it of great aid to study the books to refresh their memories with the somewhat intricate relationships which are found here, before tackling any of these cases. To mention a few of these important anatomical features, let me call to your mind the perpendicular septa and the fatty compartments of the anterior closed space of the distal phalanx of the finger; the exposure of the tendon sheaths of the fingers just beneath the skin at the middle and distal flexion creases; the canals through which the tendons of the lumbrical muscles pass; the connection of the tendon sheath of the little finger with the ulnar bursa which in the palm and wrist surrounds the tendons of all of the flexor tendons, except those of the thumb; the similar relationship between the tendon sheath of the thumb and the radial

bursa; the limitation of the tendon sheaths of the other fingers at the transverse bend of the hand; the thickness of the skin of the palm resulting so frequently in the collar button type of abscess and lastly the fascial spaces of the palm, deep to the tendons, divided by the transverse adductor muscle of the thumb. The free motion of the fingers in the fine movements of the hands depends upon the free play of the tendons within the sheath, and the small muscles outside.

### PATHOGENESIS

Infections of the skin and subcutaneous tissue arise in two common ways. Organisms invade these regions either from outside or from within the body. Organisms from without may either penetrate through an intact skin or be carried into the deeper tissues through a wound of one sort or another. Invasion from without is by far the commonest cause and the one with which we shall chiefly deal in this paper. Organisms from within may reach these tissues either by direct extension from some deep focus, as for example, from an osteomyelitis or through the circulation as metastases from some other region. These will be more fully considered by other speakers.

*"Spontaneous" infections.* Let us first consider those infections due to organisms penetrating the body through a seemingly intact skin. When bacteria lodge in the ducts of the sweat or sebaceous glands or skin crevasses, some of them find the environment favorable for their proliferation. As soon as they have begun to metabolize, their secretory or excretory products are discharged into the surrounding medium and may be irritating to the neighboring cells. Organisms are usually quickly washed or rubbed off from the surface of the skin and if they stay for any length of time on the surface, they are not likely to find the conditions of moisture and nourishment satisfactory for growth and multiplication. Even if they were to do so, the horny layer of the skin, in most cases, would resist the irritating action of their products. In the sweat and

sebaceous glands there may be only a few layers of living cells separating the bacteria from the subcutaneous tissues. By continued multiplication the organisms may call forth a leukocytic response which results in a frank formation of pus. The epithelium over the small focus becomes pushed up and the pus shows through a thinned out layer of epithelium, and we call it a pimple or a pustule. I believe that these lesions are almost always due to organisms from without and not due to "bad blood" as the patients so often suppose. I wonder how often this misconception is due to something the doctor has told them? Usually these pustules are very superficial affairs and in the great majority of cases spontaneously resolve; but if this lesion is squeezed or pricked, the organisms frequently invade the deeper tissues. Then the compartments and partitions in the deeper layers of the skin, of which we spoke above, particularly at the back of the neck, on the back and on the dorsal surface of the forearm, play a part in the further progress of the infection. If the bacteria get down beneath the epidermis and into these columns, as they proliferate, their metabolic products cause a liquefaction of the soft tissues between the partitions. This liquefaction permits the organisms to migrate downward in these columns and they follow this line of least resistance until they strike the layer of subcutaneous fascia. Then they spread laterally beneath the partitions and, again following the line of least resistance, spread upward toward the surface in the adjacent columns; at first resulting in extreme swelling due to infiltration of fluid and wandering cells; and later resulting in necrosis of the tissue partly by the direct action of the metabolic products of the bacteria and partly the thrombosis of blood vessels. If the infection limits itself to a single compartment, it remains a furuncle but if it involves neighboring compartments it becomes a carbuncle. In parts of the body where these partitions do not exist or are thin, a single cavity forms and this is called a furuncle if small; or an abscess, if large. The organisms which are able to gain a foothold in the hair follicles or sebaceous glands and sweat ducts are usually

limited to the staphylococcus group. When hemolytic streptococcus enters, it may produce pustules or furuncles, but frequently spreads extensively in the superficial layers of the skin causing the well-known picture of erysipelas. More rarely the anthrax bacillus is the cause of an apparently spontaneous lesion. These organisms may be said, therefore, to penetrate the intact skin.

*Infections arising from contaminated wounds.* Almost all other organisms which cause infections of the skin and subcutaneous tissues are introduced through a broken skin. This break may be microscopic, but in most cases it is more than that for there is usually a history of a prick, a cut, a scratch, an abrasion or a laceration. If the break goes down to the layers of living cells where body fluids are circulating, the organisms which are introduced immediately find a medium in which certain of them may be able to grow.

In the great majority of cases when cultures are made, infections of the skin and subcutaneous tissues yield a single organism, this would seem to indicate that often only one type of organism, of the many different kinds which are surely introduced whenever a wound is made in the skin, is able to maintain itself against the defences of the body, grow, multiply, and metabolize, while the other organisms do not. This would lead one to believe that in most instances the conditions are not favorable for the great majority of organisms which are introduced and the fact that many wounds heal without infection would also lend weight to this idea. On the other hand with many wounds, particularly those in which there are many foreign bodies in the form of particles of dirt, and in which there is considerable injury to tissue, the conditions are favorable for a large variety of organisms so that more than one type gains a foothold. It is well known that there are certain bacterial synergisms and antagonisms; certain species will not grow together, while others augment one another. In general it may be said that when a wound is infected with two or more different varieties of organ-

isms, the infection is more severe than if only one of these types is represented.

*The establishment of bacteria in a wound.* Whenever a wound is made, there is an indeterminate number of organisms of different species and inert foreign bodies introduced, but there is also some injury to the tissue cells, some extravasation of blood and lymph and a concomitant injury to the blood vessels supplying the area. It is of interest to speculate upon the course of events which take place when bacteria have passed the primary physical barrier of the surface epithelium and have entered into the deeper tissues. They may have come directly in an actively growing state from another animal or human body, and find themselves in an environment not very different from the one they have just left; or they may have come from an environment entirely different from the one in which they find themselves. Chesney, Burke and many others have studied the question of the viability of organisms and the dormancy of organisms when transferred from one environment to another and have shown that a lag or a dormancy in their development varies with the differences in environment on the one hand, and the differences in the individual organisms, on the other. In general, it may be said that when bacteria, in an actively growing state, are transferred to a similar environment they develop much more rapidly, than if they are not in an actively growing state or are transferred to an entirely different medium. At the same time even from an actively growing culture, when individual organisms are transplanted, some grow out quickly while others lie dormant for a number of days or even weeks. These points are of particular interest in our consideration of the question of the initiation of an infection, when bacteria have gained entrance into the body, and help to explain why it is common for pathologists to become infected from autopsies, or for surgeons to become infected when they prick a finger with a knife or a needle during an operation on a septic case; or for patients to infect themselves, producing series of boils, or carbuncles, over a period of weeks or

months; or for epidemics of infection to spread in hospitals where there is not the most meticulous care in the treatment of infectious cases.

We must first consider from the point of view of the bacteria whether or not they are viable, and if viable whether or not they can adapt themselves to the conditions sufficiently well for them to proliferate and produce toxic products. Certain conditions of temperature, hydrogen-ion concentration, oxidation reduction relationships and nutrient material are necessary for the growth of bacteria and any organisms which survive must not only find conditions favorable but must be able to resist the so-called defensive forces of the body. .

*Incubation period.* When a wound is made and contaminated with bacteria, most of the organisms which are introduced do not find a favorable environment and either lie quiescent or are destroyed. If they survive there is almost always an interval of hours or days before the signs of infection set in. This is called the "period of incubation" of the disease. This depends first of all upon the elaboration of irritating substances arising from the bacteria, from the dead tissue and from the foreign substances which have been introduced; and secondly upon the rapidity with which the body can react to those irritating substances. From the point of view of the bacteria the speed of the inflammatory reaction depends upon the number and virulence of the viable organisms originally introduced, the rapidity of their adaptation and multiplication and the intensity of the irritating quality of their metabolic products. From the point of view of the body, the evidence of inflammation awaits the reaction of the local tissues to the foreign substances which have been introduced or elaborated and the mobilization of the other defensive forces from remoter parts of the body. The speed of the reaction also depends upon the state of relative immunity or susceptibility of the individual to the organisms in question.

*Immunity and susceptibility.* We know very little

about resistance of the body against such organisms as the streptococcus and staphylococcus. Apparently many of the laws which come into play in the development of immunity to other diseases do not apply to these infections. There is no natural, racial or individual immunity of any importance against these organisms and after an infection, even the local immunity which apparently can be demonstrated, is a transient thing. On the other hand there is considerable clinical data to indicate that these infections often originate at a time when the individual is below his or her normal health. In a few instances these infections occur in patients who are perfectly well but more often, there is a history of exposure to cold, a period of mental or physical strain of one sort or another, or some precedent illness. Streptococcus is notably an organism of secondary invasion which produces many of the serious complications of diseases such as the exanthemata, and it is believed that this is so either because of some adjuvant action which the streptococcus has, when it grows along with some other organism, or else that the individual has lowered his threshold of resistance against the streptococcus. What is the meaning of this lowered resistance? Is it possible to overcome it, either before or after the advent of the infection? Is it possible to measure it? It seems rational to believe that what we call "general health" would affect the immediate defensive factors at the site of entrance of organisms for example, in a contaminated wound, in such diseases as diabetes where the sugar content of the tissues may be increased or in vascular diseases where the nutrition of the tissues is continuously inferior. More important still are those disturbances of general health which interfere with the ability of the body to mobilize the defensive elements coming from other parts of the body. Any illness either acute or chronic may make it less easy for a patient to mobilize his defense at the site of the invading organisms. Cold or hunger may delay it. An instability of the sympathetic nervous system may not only delay the mobilization of the defenses in remote tissues but alter the permeability of the capillaries at the



site of infection rendering it difficult for the leukocytes and other protective substances to pass through the blood vessels and localize at the site of conflict.

*Sensitivity.* It is well known that in children and to a certain degree in youth up to twenty years, infections may arise in bones or other internal tissues which have no contact with the exterior of the body, without any apparent evidence of an inflammatory reaction to indicate the portal of entry of the organisms. Inasmuch as the causative organisms are generally of the staphylococcus or hemolytic streptococcus groups, the most likely point of entrance is somewhere on the skin or nasopharynx. The explanation which has been offered for this phenomenon is this, that children and youth are not sufficiently sensitized to these organisms to arouse any reaction to their presence when they enter the body. Nevertheless the organisms survive, are picked up in the circulation and are transported to internal tissues. Like other foreign bodies they are picked up by the bone marrow capillaries, spleen, liver and lungs. Some writers have thought that this localization of bacteria is due to some special predilection of certain bacteria for certain tissues. It has even been called a "chemotaxis" of certain tissues for certain organisms. The bacteria are generally destroyed in the lungs, liver, and spleen but in the bone they may be able to gain a foothold and multiply. During the incubation period the body becomes sensitized and at the end of that period, the whole process blossoms forth as an acute infection. In contradistinction to children, adults, being already sensitized, react promptly when the bacteria appear at the portal of entry. This seems to be a plausible explanation in view of certain facts which are now known about the sensitization of individuals to bacteria and their products.

#### PATHOLOGY

*Signs and symptoms of inflammation.* When bacteria multiply and secrete their metabolic products, certain chemico-physical alterations occur in the surrounding tissues to which the body reacts with certain chemico-

physical changes which give us the well-known picture of inflammation. Redness, pain, swelling and heat develop. The redness is chiefly due to the dilatation of the blood vessels, which we call a local hyperemia. Heat is due chiefly to this increased circulation, but may be also due to some extent to the chemical reactions taking place. The swelling is due to the exudation of fluids and the infiltration and extravasation of cells. The pain is due in part to the swelling but chiefly to the direct action of the inflammatory products on the pain nerve receptors.

*The migration of leukocytes and chemotaxis.* In the early stages of inflammation one of the most striking phenomena is the localized concentration of polymorphonuclear leukocytes. These have been seen in the process of passing through capillary walls. The process by which they are attracted to the site of irritation is called positive chemotaxis and it is thought to be due to certain surface tension changes resulting from the irritating substances. For it is known that a cell will move in the direction of that portion of its circumference which has the lowest surface tension. The chemotactic influence is most intense at the site of the activity of the organisms and becomes less so as distance increases. A general leukocytosis usually results from a stimulation of polymorphonuclears in the bone marrow, either by a direct action of the chemotactic influences reaching the bone marrow through the circulation or by an indirect action from an initial leukopenia caused by the withdrawal of leukocytes at the site of inflammation from the general circulation. In the later stages of the infection there is a gradual increase in the number of large mononuclear leukocytes which, according to varying opinions, arise from local fixed tissue cells, from the endothelium of blood vessels, from the monocytes of the blood or else reach the part through the general circulation or by direct migration from other sources. Whatever their origin, it is certain that they are found in great numbers in the later stages of almost any infection.

*The process of inflammation.* After the initial signs of inflammation appear, the course of events depends upon the balance of the forces pitted against one another and the structure of the battleground over which they struggle. The battle may exhibit any degree of intensity. The organisms may proliferate rapidly or slowly. Their metabolic products may act directly on the tissues causing necrosis or they may diffuse widely in the local tissues without destroying them and be carried off into the general circulation causing intoxication of remote tissues or the body as a whole. The capillary system of blood vessels and lymphatics is a closed system. Fluids may pass through the walls, either through or between the cells but bacteria are held on the outside until they are taken up by wandering cells or endothelial cells and carried inside, or until the wall is liquefied and an opening is made. It is probable that before liquefaction of blood vessel walls takes place, thrombi form within. There may be extensive thrombosis of the capillary blood vessels and lymphatics, thus increasing the rapidity of tissue necrosis. Thrombi may spread from the smaller radicles to the large vessels and as liquefaction of the blood vessels themselves takes place, the bacteria heretofore outside of the circulation, find themselves inside, but held for the time being by the clot. They may, however, continue their activity, liquefy the clot and when they have reached the limits of the thrombus be carried off in the blood stream to the heart and thence to distant capillary beds. If they are in masses either because of agglutination or because imbedded in blood clot they are generally caught in the capillaries and are either destroyed or continue to grow forming a metastasis and this in like manner may in turn send out its metastases on the venous side.

*The spread of infection.* It is interesting to note in autopsy studies of these infections that in some instances the spread of the infection is solely lymphatic and in others solely venous. In still others, to be sure, the spread is both venous and lymphatic but usually one or the other route predominates. This may be accidental but one won-

ders whether or not there is a predilection of certain organisms for certain routes or certain tissues. When bacteria have entered the circulation as individuals, they are rapidly destroyed as Hopkins and Parker and others have shown. These workers injected sublethal and lethal doses of streptococci into rabbits and at frequent intervals thereafter took blood cultures. The number of circulating viable bacteria rapidly diminished and entirely disappeared in the sublethal doses. In the lethal doses also they entirely disappeared for a time but after an interval, reappeared and increased in numbers until death ensued. They found on autopsy in the sublethal cases remnants of bacteria in the capillary endothelium of the lungs, liver, spleen, and bone marrow, and in the lethal cases they invariably found foci of bacterial growth. The increase in bacterial count in the blood stream did not represent an actual growth of organisms in the blood stream but an outpouring of bacteria from these foci in greater numbers than they could be killed off in the circulation. When it is remembered that the blood makes a complete circuit of the body every minute, passing through two or three capillary beds with each circuit and that even under the best of conditions bacteria multiply only once in every fifteen or twenty minutes it is seen that bacteria have to run the gauntlet of the capillary endothelial cells thirty to forty times and be subject to the lethal action of the circulating blood for a considerable length of time. It is probable that not until these defenses are exhausted, in other words not until just before death, do the bacteria in the blood stream multiply. I think that we may safely say that if a septicemia persists, there must be a focus somewhere pouring out bacteria into the blood stream faster than they can be killed off. This is an extremely important fact to keep in mind, in our treatment of these infections.

*Cellular resistance to bacterial spread.* Some of the tissue cells at the site of the lesion take part in the phagocytizing of the bacteria but in the initial stages of the infection the chief activity seems to be on the part of the polymorphonuclear leukocytes. They migrate from blood

vessels, take up bacteria, sometimes destroy them and at other times are destroyed by them either before or after their ingestion. The less resistant bacteria are destroyed and the less resistant cells are destroyed. Here we have a survival of the fittest so that as the bacteria which survive proliferate, the more resistant qualities are propagated from generation to generation. As Welch has said the bacteria develop an immunity to the body and it may be that even within a single generation an organism may develop an increased resistance to the body cells. On the other hand the tissue cells, although they do not proliferate as rapidly as the bacteria, are believed likewise to increase their resistance to the bacteria. As vessels become thrombosed, the way is blocked for the emigration of the leukocytes but where the vessels are patent at the periphery of the lesion they are able to pass through the vessel walls and in this zone are preponderant over the organisms. When infected tissues are stained to show bacteria it is seen that they are present in great numbers where there has been tissue necrosis but in the zone of cellulitis they are relatively few. Here the body cells have the advantage and either spontaneously or with surgical help generally halt the process. However, if the bacteria are able to withstand this defense and continue to proliferate and produce their toxins in spite of it, the tissues break down and the zone of cellulitis advances. It is easy to understand that there may be very little absorption from a central area of necrosis but a great deal from a zone of cellulitis where blood vessels are patent and the circulation of fluids continues. As we have said above in the later stages of an infection an examination of the tissues under the microscope reveals an ever increasing number of large mononuclear phagocytes, clasmatoocytes, or histiocytes as they have been called. To these cells we attribute the defense which finally gets the better of the infection and they too are probably responsible in no small measure for the local immunity which persists for a time against reinfection with the same or even with other organisms.

## CLINICAL VARIATIONS WITH DIFFERENT ORGANISMS

*As indicated by the nature of injury.* It is of importance for the surgeon to know the organisms causing the infection. At times the site of the lesion and the nature of the injury will enable one to predict, with some degree of certainty, the species of organisms which has been introduced and the type of infection which may develop. For example, the infections which arise following a human bite are known to carry a mixture of mouth organisms which produce a fairly characteristic initiation and course of infection. Lacerated wounds, produced by fragments of shell in war time carrying in clothing and soil, are known to result frequently in an infection with the organisms of the soil and feces—namely, gas-gangrene, tetanus and the like. Infections which develop after operation, particularly where the tissues have been uncontaminated before, are known to yield the organisms which are common in the air or in the nose and throat of the operating personnel when improper masks are worn and either the nose or the mouth is exposed. If peritonitis is present at the time an abdominal wound is made or the gut is opened during the course of a celiotomy, the subcutaneous tissues may become infected by the organisms known to be present in the intestine.

*As indicated by the symptoms and signs.* The type of organisms may also be frequently prognosticated by the development and course of the early stages of an infection, for example, when local and general symptoms arise within the first twelve or twenty-four hours following a wound, the infection is commonly due to the hemolytic streptococcus. Wound infections which develop more slowly are more likely to be due to the staphylococcus group, and the general symptoms occur later. Staphylococcus infections in general, run true to form, except that they vary considerably in the degree of intoxication and in the rapidity of their development. They are usually characterized by a fairly rapid necrosis of the subcutaneous tissues. The process is usually localized fairly

early and the neighboring tissues are relatively normal. Streptococcus infections on the other hand, usually cause a very rapid development of general intoxication. The process is more diffuse and it spreads rapidly. The surrounding tissues are not normal, but are edematous and red and there is very little destruction of tissue but a marked infiltration of fluid and cells. When such tissues are examined under the microscope, there are seen edema and cellular exudation in which the nuclei of the cells stain sharply with apparently no death of cells or connective tissue. Under certain conditions, however, possibly in hypersensitive individuals, there is a very rapid necrosis of tissue and very rapid thrombosis of blood vessels. This necrosis of tissue in both staphylococcus and streptococcus infections results in a liquefaction of the tissues most involved, and a cavity formation at this site which grows larger as the necrosis spreads outward from the centre. When there is a symbiosis of two or more different varieties of organisms, necrosis may take place when a pure culture of either one would result simply in edema without any necrosis.

#### TREATMENT

With the foregoing general principles in mind how shall we treat infections of the skin and subcutaneous tissues? The purpose of the surgeon in his treatment of all of these conditions should be to restore the part to its normal form and function as soon as may be. The ideal result would be a resolution of the part without any evidence of destruction of tissue but more often than not when an infection is well under way the surgeon's knife may be called upon to destroy superficial tissue in order that there may be a cessation of further destruction of the deeper structures.

*Prophylactic treatment.* Prophylactic measures with regard to those infections which appear to be more or less spontaneous but which arise from organisms entering through hair follicles and sebaceous and sweat glands, consist in frequent washing of the skin with hot water

and soap, particularly after the exposure of the body to known sources of contamination. This especially applies to doctors and nurses who frequently handle infected wounds. The prophylactic treatment of infections which arise in wounds has of course been given great consideration by countless surgeons in times past. This is more important and more difficult than that which we apply to avoid spontaneous infections because of the variability of the depth and extent of the wound and the variety and number of the organisms and other foreign bodies which are introduced into the wound. Our whole surgical aseptic technique is prophylactic against these infections in operative wounds. When wounds have occurred from injury we must assume that organisms have been introduced and from our experience we may estimate to some degree the number and kind if we know the conditions under which the injury took place. The chief prophylactic measure is the removal of these organisms and other foreign bodies from the wound, as completely as possible. Likewise any injured tissue should be excised, which the part can safely spare and which might favor the growth of those bacteria which remain. The former can frequently be carried out to a considerable extent by the patient himself or the lay members of the family, if a doctor is not immediately available; but the doctor must review this preliminary treatment and carry it further if necessary when he arrives. Certain life insurance companies have circularized the public with regard to this important step in the prevention of wound infection and have particularly advocated cleansing rather than using antiseptics for fear too much reliance should be placed upon the latter and the cleansing be neglected. This emphasis on cleansing cannot be too greatly stressed but with the wound as clean as possible, antiseptics may be used and in my experience, Dakin's solution, bichloride of mercury, mercurochrome or iodine locally may be safely and effectively employed. Sometimes the suturing of a wound may be considered a prophylactic measure against infection but this should only be done in tissues well supplied with blood like the face or scalp and



when the wound has been made within an hour after the injury. In any other circumstances, suturing may favor rather than prevent an infection. When the nature of the injury would lead one to suspect the presence of soil organisms the prophylactic use of tetanus or gas-gangrene antitoxin is indicated.

*Abortive treatment.* When the first signs of infection have appeared, measures should be instituted which may be called abortive. When pimples have developed, and they may do so in a very short time, the measures should be conservative, any manipulation of the parts should be avoided. Picking, scratching, squeezing, are all strongly contra-indicated for we know that if these pimples are left entirely alone, the great majority of them will subside quietly and disappear within three or four days. On the other hand, we know that if they are manipulated, or picked, or squeezed that a large proportion of them will get worse, the infection will spread into the deeper tissues and even in the best of hands will produce serious lesions which take a long time to get well. Furthermore, when pustules are broken the organisms are invariably carried by hands to other parts of the body surface or are rubbed into neighboring pores. When pimples first form, the resolution process may be favored by the use of iodine and if this be painted upon the pimples morning and evening without any manipulation, nine times out of ten, they will dry up with great rapidity. Such resolution is also favored by an erythematous dose of sunshine, ultra-violet light, or X-rays. If the infection has gone beneath the skin into the subcutaneous tissues, the application of iodine, ultra-violet light, or X-rays is in my experience, of little value. Abortive measures in the earliest stages of those infections resulting from contaminated wounds, consists in opening the wound, removing all gross foreign bodies still present, the application of heat or the instillation of Dakin's solution. At times a complete debridement of the area is indicated before heat or antiseptics are used.

*Active treatment.* With an infection in full swing, the

"spontaneous" skin lesions such as furuncles and carbuncles are best treated by the application of heat and an adequate opening at the proper time. This requires the best judgment of the surgeon. With furuncles the application of heat may result in a resolution and a spontaneous discharge of the necrotic core, but if they do not resolve promptly they should be incised when central fluctuation can be appreciated with the palpating fingers. A crucial incision into a furuncle at that time will usually result in prompt resolution. In certain parts of the body where it is desirable to avoid scarring, as on the face, compromise measures must be adopted. Here an opening may be made painstakingly through the skin with carbolic acid on a toothpick. This opening tends to seal and must be kept patent with grease until the necrotic tissue has entirely liquefied and come away. Usually several applications of carbolic are necessary. With carbuncles, the columns and the partitions which we have mentioned above must be kept in mind. In places where scarring is to be avoided the compromise measures may be applied but the solution of the tough partitions is a slow process even with carbolic and adequate drainage by this means is not always possible. In these cases crucial incision with an undermining of the triangular flaps up to and beyond the margin of induration thus cutting across the partitions and permitting drainage of the superficial and deep layers, will generally result in gradual resolution but the slough is tenacious and its separation must be aided by the application of Dakin's solution. To my mind, the ideal treatment for a carbuncle in those regions where scarring is of little concern, is a complete excision just beyond the margin of induration. Thus the whole infective process is removed from the body leaving relatively normal tissues. The area first enlarges but with the rapid growth of granulation tissue which ensues, after five or six days, the area may be free of all slough and ready for skin grafting. This often cuts in half or in quarter the duration of the illness and the resulting scar is reduced to less than a quarter of the original area removed. Excision is particularly indicated

in diabetics for any other method of treatment is notoriously slow and it is difficult to control the diabetes in the presence of the mass of infected tissue. The use of x-ray or the circum-injection of blood in cases of carbuncles have not proven successful in my hands for they have almost always required subsequent operative treatment and simply served to delay the final cure. With regard to the deeper and more extensive infections, as will be explained below, there are certain groups of cases in which immediate operation is demanded; but, in the majority of cases certain preliminary procedures are of value in order that the recovery may be as prompt and complete as possible. It has been found again and again that too early an operation in a cellulitis in which there is no central necrosis, delays the final resolution of the process, because drainage is inadequate and the release of tension delays the liquefaction of dying tissues. When central necrosis has taken place, the process is usually more limited in extent and the necessary limit for the incision is more clearly defined. At that time the incision gives a maximum drainage with a minimum amount of injury and the release of tension favors the circulation of the tissue which is living and increases the rapidity of its resolution and the separation of the dead walls of the cavity.

*The effect of cold and heat.* In the early stages of acute inflammation the application of cold, either in the form of a wet dressing or an ice bag with elevation of the part will frequently result in the halting of the progress of the infection and a prompt resolution. On the other hand, cold may not be well tolerated by the patient and I have seen case after case in which application of cold either did not halt the spread of the disease or else maintained it "in statu quo" without either spread or resolution. In such cases I have frequently seen a change to hot applications followed by a rapid resolution or a rapid localization of pus. For that reason, except in the very earliest stages of inflammation I feel that heat is decidedly preferable to cold in the great majority of cases. Heat may be applied by means of a radiating light or an infra-red

lamp, but better still by means of hot wet applications such as poultices or stupes. If the part can be totally immersed in a bath, heat may be effectively applied in this way. The temperature should be well above body temperature but below that which would cause a burn, in other words, somewhere in the neighborhood of  $110^{\circ}$  F. which is usually well borne. The favorable effect of heat is not clearly understood. We know that the part becomes red and assume that the circulation has been increased, and that this is responsible for the result. Attempts have been made to determine the effect of hot water-baths on the innermost portions of a member, and it is found that in the muscle it is almost impossible to raise the temperature more than a degree or two above that of the body. In the subcutaneous tissues, however, the temperature may be raised  $5^{\circ}$  or  $6^{\circ}$  above the temperature of the body and be maintained at that degree for an indefinite length of time. Assuming that the optimum temperature for the growth of organisms which infect the human body is the normal temperature of that body, it is not unreasonable to suppose that higher temperatures of even  $4^{\circ}$  or  $5^{\circ}$  will be unfavorable to the growth of the organisms. At the same time, the tissues which have been killed, become liquefied more rapidly than they would without the application of heat. And tissues in which there is simple edema and cellular infiltration, return to the normal state more rapidly than if heat were not applied.

*Emergency operations.* Although on most parts of the body surface it is advisable to delay operation until a considerable amount of necrosis has taken place and fluctuation can be definitely made out on physical examination, there are certain parts of the body and there are certain types of inflammation where this is most undesirable because delay may destroy important structures, favor extensive spread or by edema, block the vital passage ways.

*Hand infections.* The first of these exceptions is illustrated by tendon sheath and fascial space infections of the

hand. Here, any necrosis of tendons results in such a disabling interference of function, that the best surgical opinion now agrees that a suspected tendon sheath infection demands immediate operation as soon as it is seen by the surgeon. If a tendon sheath which is not infected is opened unnecessarily it does infinitely less harm than if an involved one is allowed to progress for a few hours. In the best of hands, it is only those cases which are operated on within a short time of the onset of the infection which get a good return of function. With the use of a tourniquet, so as to keep the field free from blood, it is possible to cut down upon the tendon sheath, examine it from the outside and determine without opening it, whether or not it contains fluid; if there is no distension of the tendon sheath it may be safely left alone; if it is shown to be distended with fluid it must certainly be opened, and if there has been no necrosis of the tendon sheath, or the tendon, the chances are favorable for a good return of function, provided the proper after-treatment is given. This includes the immersion of hand and forearm in hot sterile boric acid solution at regular intervals with elevation of the part wrapped in a sterile towel in between the baths. When the cellulitis has subsided the wound may be irrigated at frequent intervals with Dakin's solution to remove any sloughs which may be present. Early motion is emphasized and this depends largely upon the coöperation of the patient. Fascial space infections also demand early operation with adequate drainage and similar after-care, not so much for the danger of the infection per se as for the possible spread to the neighboring tendon sheaths.

*Hemolytic streptococcus gangrene.* Another condition demanding immediate operation is the so-called hemolytic streptococcus gangrene. This begins very much like an ordinary streptococcus cellulitis, although it is usually very much more rapid and extensive in its development. It may occur on any part of the body, but usually on the extremities; there is redness, swelling, pain, and dysfunction, due chiefly to the increased weight of the edematous member. The margin of the infection is ill defined. It fades

off into normal tissues. There is usually no lymphangitis or lymphadenitis. On the third, fourth, or fifth day the pathognomonic sign of the disease appears, which is an ill defined but definite dusky discoloration of the skin somewhere near the centre of the lesion, although it may occur in several patches distinct from one another. It is at this time that operation should be done and incision made through the subcutaneous tissues, down to the deep fascia. It will be found that the subcutaneous tissues are filled with a sero-sanguinous fluid and the fat will show an extensive early necrosis which extends far beyond the area of discoloration on the surface. The incision must be carried beyond the limits of the subcutaneous necrosis or the infection will continue to spread. Sometimes multiple incisions have to be made in order to expose this area of subcutaneous necrosis adequately. If incisions are not made when this first blue discoloration appears the gangrene of the subcutaneous tissues spreads extensively within the next few hours and the areas of the discoloration increase in size and produce blisters and bullae, giving the appearance of a bad burn. If it is allowed to progress further, through the destruction of the subcutaneous tissue, the blood culture may become positive, metastases may form in other parts of the body and death may ensue. We do not know the cause of this unusually rapid development of necrosis in these cases; whether it is due to a peculiar quality of the infecting organisms or to the hypersensitive state of the patient.

*Ludwig's angina.* A third exception to the rule of delayed operation in subcutaneous infections is the group of infections in the region in the neck in which the hemolytic streptococcus and occasionally other organisms, produce a massive dense swelling of the deep tissues under the fascia which, because of its denseness, masks the sign of fluctuation. Here the edema, by spreading towards the larynx and œsophagus may block off the airway or produce dysphagia. Here early incision, even though it does not find a deep abscess cavity relieves tension, offers a certain degree of drainage and frequently prevents or relieves the

edema of the larynx which offers such a real threat to the life of the patient.

*Gas-gangrene.* Another infection of the subcutaneous tissues demanding immediate operation is gas-gangrene. When the symptoms and signs of this affliction are present—namely, prostration, with rapid pulse, high fever, anxiety and local evidence of a rapid spread of infection, swelling, redness, pain, heat and subcutaneous emphysema, with or without a bronzing of the skin; any delay in operation increases the risk and makes the cure more difficult. These cases need extensive incision, the removal of foreign bodies and necrotic tissue, and prompt administration of large doses of gas-gangrene antitoxin. If the organism has been determined this antitoxin should be specific for the organism in question; but, if it is not possible to determine the organism promptly, a polyvalent antitoxin should be used.

#### POST-OPERATIVE TREATMENT

After operation the surgeon must continue to use the means at his disposal for the rapid resolution of the process, the separation of the dead tissue, the contraction of the healing tissues and the final closure of the wound. As long as there is any diffuse inflammation, the application of heat is indicated either by poultices, hot water bags, light or by immersing the part in a bath; but, when the cellulitis has completely subsided the removal of the dead tissues is the next most important step. And now the use of Dakin's solution delivered to the site of the necrotic tissue at frequent intervals of time, offers the best means which we now have at our disposal. For the separation of slough where the wounds are deep and the dressings are painful, Dakin's solution may best be delivered by the Carrel tubes. Where the cavity is superficial, it can often best be delivered by the frequent application of compresses wet with the solution; and their removal at frequent intervals has the added advantage of removing the exudate and the liberated pieces of slough. When the slough is entirely separated and granulations are active and bacteriological ex-

amination of the exudate reveals the absence of bacteria both on smear and culture, the wound may be closed. This secondary closure may be done at times in the presence of innocuous organisms, but should never be done if streptococcus is present or other virulent organisms. A flat wound cannot easily be closed secondarily without extensive undermining. Skin grafting is indicated for these wounds and this may be done before there is bacteriological evidence of complete sterilization of the wound, providing that there is evidence of new epithelium already around the margin of the wound, and provided that there is no undermining of the edges of any part of the wound. For if grafting is done when those edges are present, the grafts will not take in the neighborhood of the undermined flaps, but will be digested by the exudate coming from beneath the flaps.

#### GENERAL TREATMENT

After the proper surgical handling of the infection itself, what measures are there available for building up the general resistance of the patient? I shall consider a few of the important measures that have been tried, namely, transfusion of blood, medication by mouth or vein, diet, ultra-violet light, vaccines and sera.

*Transfusions.* Blood transfusions are being used more and more in the treatment of infections, but there is no unanimity of opinion with regard to their real virtue, inasmuch as protective antibodies are not present in serum and the relatively small number of leukocytes transferred could not be expected to have any particularly favorable action. While transfusion may have little effect upon the course of the infection it usually makes the patient feel better and may be used. This may be just enough to turn the tide in the patient's favor but we must not expect too much of it as a curative measure. The expense of transfusion at the present day should be kept in mind. In anemic cases resulting from prolonged infection by hemolytic organisms, transfusion is of real value but I have seen transfusion used repeatedly in the acute stages of infection



without any definite improvement in the condition of the patient and certainly transfusion should never be made a substitute for the proper surgical procedure. On the other hand during convalescence, after the acute process is under control, transfusions do a striking amount of good, perhaps helping the patient more than any other form of treatment.

*Chemotherapy.* The use of medicines in these infections is of very little avail. Tin preparations in staphylococcus infections or copper in streptococcus infections have not yielded the results claimed for them. The "sterilizans magna" so hopefully anticipated by the intravenous use of antiseptic dyes such as mercurochrome, gentian violet, acriflavine and the like, has been tried and found wanting. When given intravenously these dyes are very rapidly diluted in the blood and withdrawn from it by the tissues, so that their concentration in the blood which reaches the focus of infection is far below the concentration necessary to destroy the organisms, unless injected in doses which are toxic to the body as a whole. In fact the organisms at the site of an infection are not approachable by these substances even when they are injected directly into the artery supplying the part which is involved, as Zau and the writer showed. This does not mean, however, that hope should be abandoned in this direction for the time may come when a substance will be found which can be given in such concentration as to affect favorably the course of the infection without injuring the normal cells of the body.

*Ultra-violet light and vitamines.* In recent years ultra-violet light has been given a great deal of credit for improving the general body resistance. We do not know how it acts, but it seems to have a favorable effect in certain cases. The subject is a relatively new one but it offers an encouraging field of research which in the future will almost certainly rationalize this method of treatment. Still more recently the question of vitamine deficiency, as a predisposing factor to infections, has been given a considerable amount of attention both by clinical and laboratory observers. Vitamine B has been considered the most im-

portant vitamine element necessary to increase the body's resistance to infections. Here again the question has not been settled, but the popular use and abuse of yeast is one of the results of this investigation. It has been said that the normal diet of man has an excess of this vitamine, but, when the patient cannot take a normal diet it is possible to increase to a considerable extent the intake of vitamine B. No harmful effects have been reported as far as I know.

*The use of vaccines and sera.* On another evening the subject of vaccines and sera will be taken up in more detail but from the point of view of infections of the skin and subcutaneous tissues, I would like to speak briefly of my judgment concerning them. Research workers who have studied streptococcus and staphylococcus have been continually baffled by the weakness of the response of experimental animals to vaccines. Within recent years it has been found that antitoxins may be produced in animals by the injection of toxic filtrates from certain strains, of both streptococcus and staphylococcus. In other words, it is possible to develop antitoxic sera which will specifically neutralize the toxins produced by these bacteria. But it is extremely difficult to produce any real bactericidal antibodies by vaccination with the organisms themselves or the inoculation of any of their products. Dr. Dochez, who was one of the first to produce an antitoxin for the toxic filtrates of the streptococcus of scarlet fever, has been unable to produce an antibacterial serum. Dr. Park and his staff have likewise been baffled in the attempt to produce a serum which will combat the invasive properties of these organisms. Hopkins and Parker have been working on the same problem with staphylococcus and again although able to produce antitoxic sera which specifically neutralize the toxins of staphylococcus, they have not been able to produce a serum which affects in any way the invasive properties of that organism. Wright thought that by vaccination he could improve the opsonic index of patients and experimental animals and thus increase the resistance of the body to these infections. But these results have not

been confirmed and the technique of determining the opsonic index of serum even in experienced hands, has a large percentage of error. Although staphylococcus and streptococcus sera are made by several of the commercial firms and are used to a considerable extent by some practitioners who occasionally report extraordinarily good results of their use, in the hands of most critically minded doctors they have failed in the great majority of cases, as a survey of the subject reported in the recent medical literature indicated. I think that we may safely say that passive immunization with sera which are now available offers little hope of success in streptococcus and staphylococcus infections. One is justified however, in trying erysipelas serum in toxic cases of erysipelas. Anthrax antiserum has been used with real success in proven cases of anthrax and should always be used when it is available.

Very little can be said for active immunity. If it is impossible to produce a serum of any potency in experimental animals, it is equally difficult to produce it in man. The examination of the serum of patients who have survived an infection with these organisms, shows very little evidence of any protective substances. Even agglutinin or precipitin are frequently impossible to demonstrate in the serum. Giving vaccine during the course of an acute infection, or even a chronic one, is like adding fuel to flames. The only rationale of such treatment would be the theory that dead organisms or attenuated organisms injected into the normal tissues away from the lesion can produce protective antibodies which could be carried from the site of the inoculation to the site of the infection. This theory has not been satisfactorily substantiated by experimental proof. Vaccines have been used more extensively than sera in the treatment of such cases and have been given the credit for marvelous recoveries but there is little evidence that they were responsible for the cures. I have frequently prepared vaccines to be used in patients presenting a series of boils, and just at the time that I was about to begin their use, the patient showed evidence of recovery so that they were withheld. I have no doubt that in many

instances they have been administered under such conditions and have been given the credit for the cure which would have occurred quite as well without their use. The explanation of the failure of the body to produce effective protective antibodies against streptococcus and staphylococcus, is not understood. Dreyer believed that the tubercle bacillus could not be digested by the body down to the point where protective antibodies could be formed. He therefore suggested digesting the organisms outside of the body by means of trypsin or pepsin after the removal of the capsule by means of acetone. He believed that if the tubercle bacilli were digested down to just the right point and then injected, the body would be able to react to this split product of the organism and develop real protective antibodies against it. Dreyer's evidence was based upon insufficient experimental data, and other workers have not been able to confirm his results, as far as tuberculosis is concerned, but the theory may be sound and should be tested with other organisms. The studies which are now being made by Avery, Lancefield, Parker, Hopkins and others with regard to the antigenic properties of various fractions of the streptococcus and staphylococcus bodies may lead to the solution of this very important problem. Zinsser has stated that the size of a foreign protein molecule may be too large to enter the body cells. Before these cells can develop antibodies against that particular molecule of protein, it must be broken down until the size of the molecule may be sufficiently small to enter the cell. The difficulty of digesting streptococcus and staphylococcus with the usual proteolytic ferments is well known, and it may be that in these infections the ferments of the body are likewise unable to break down these proteins.

Besredka has attempted to overcome the difficulties of streptococcus and staphylococcus immunization by the use of bacterial filtrates, made from cultures in which the organisms have grown for some time. He has shown that the organisms do not grow in these filtrates and believes that they are exhausted as far as the nourishment requirement of the organisms is concerned, and more than that

contain an "antivirus" produced during the autolysis of the bacteria which helps to destroy organisms with which the filtrates come in contact. He advocates using these filtrates either by injection or application directly to the infected wound. Besredka's work has stirred up considerable controversy but his favorable reports have not been consistently confirmed by other workers.

### CONCLUSION

When the patient gets well under treatment which we have found by experience to favor the recovery, we must realize that it is not the surgeon but the patient who overcomes the infection; the surgeon may turn the balance in favor of the patient by removing a large proportion of the bacteria and toxic products, and by improving circulation; when he relieves tension and applies heat. But after all, it is what goes on in the living tissues at the site of the lesion that determines whether there is to be recovery or further destruction. We know that patients recover from these infections and we assume that they have gained the upper hand by the development of some defense against the organism, but an examination of their blood serum fails to reveal any evidence of substances of a protective nature. Apparently the defense is purely a local one. The local tissues at the site of infection, develop a resistance which overcomes the invading organisms and which destroys most of them. After that it may be demonstrated that these tissues have a local immunity against further infection with the same organisms. Besredka demonstrated this and he found that the defense is a specific one, so that it is not merely the congregation of wandering cells but the adaptation of tissue cells which has occurred during the course of the infection which has enabled them to overcome the infection.

Acute infections may be divided into three groups, from the point of view of recovery. The first group includes those cases which recover without treatment or in spite of bad treatment. In another group the patients fail to re-

cover and die even though the best treatment that we know is applied promptly. The third group consists of those whose prompt recovery and cure depend upon the right treatment at the proper time. It is in these latter two groups that we are striving for an improvement in our results; for the former group to bring into the field of recovery those who now die in spite of the best treatment that we know; and for the latter group to increase the knowledge of both the patient and doctor, so that the best available treatment may be administered at the best time.

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JOHN S. BROWNNE  
1854-1931

## JOHN S. BROWNE

JOHN S. BROWNE, Librarian and later Consulting Librarian to The New York Academy of Medicine, died at his home Haworth, New Jersey, February 27, 1931, aged seventy-six years.

The ending of this long and honorable career marks a notable event in the history of the institution to which, for nearly half a century, he contributed the full interest and endeavor of his life.

The Academy of Medicine, to-day in the full vigor of its well-developed prime, is the outcome of the earnest and intelligent efforts of many generations of able and devoted men, carried forward unremittingly for eighty years. As a factor in its progress the part contributed by Mr. Browne was an all-important element. Our debt to him is great and lasting.

Thirty-five years after the founding of the Academy it had attained an importance which demanded a permanent home, properly equipped and managed for the effectual carrying out of its ever increasing affairs; since these had come to require more time and attention than any, even of its most self-sacrificing members, could afford, the services of a professional Librarian and General Superintendent had become imperative. When, in 1875, possession was taken of its first permanent home, in 31st Street, its far-sighted officers soon recognized the possibilities of its expansion and the necessity for its efficient management and, after long deliberation, from among thirty promising applicants whose qualifications were carefully studied, a selection, in 1880, was made.

Since then, the history of the Academy has been intimately identified with the life experience of that one who proved so largely responsible for its steady growth and prosperity. Quietly, without a suggestion of



self interest or obtrusiveness, his influence was exerted for the upbuilding of our institution, with a singleness of purpose and a steadfastness of devotion for which it would be hard to find a parallel. To it, more than to any other individual factor, was due not only our material prosperity but, even more important, that spirit of harmony which attended the Academy's contemporary existence. The character and personality of the man invariably attracted the best of those who knew him, both of the medical profession and of the laity, here and everywhere. He gained not only their confidence and friendship but their unqualified support, on his own part encouraging where encouragement was helpful, aiding by wise suggestions when consulted and by his hearty co-operation in the execution of the work; knitting together the forces of good for the general strengthening of the whole. His influence, exerted with intelligence and often with rare diplomacy, together with complete knowledge of what had preceded, caused each administration to glide quietly into the next without friction and with no interruption to the routine. Men in ever succeeding groups came and went, each faithfully and efficiently accomplishing his individual task. The all-embracing work of Mr. Brownne was perennial.

In reviewing the life of Mr. Brownne we are not surprised to find that he came of an ancestry sterling in itself and well adapted to the development of the particular abilities by which he himself was characterized.

His grandfather, Charles Brownne, a ship builder by profession, came from England in 1788 and established a shipyard in New York City in 1800. He was commissioned by Robert Fulton to build the "Clermont," and thus became the maker of the first practical steamboat. Fulton, his warm friend, bequeathed to him his watch, now in the possession of the family.

His father, Robert H. Brownne, was Librarian of the fine collection of Robert L. Stuart, later President of the American Museum of Natural History, and of the Presbyterian Hospital. He was also secretary to the North West-

ern Dispensary and was secretary and Librarian of the New York Lyceum of Natural History, the most influential scientific society of its time, itself an Academy in the highest acceptance of the word. Its membership included men of distinction in various departments of learning, among them Dr. Torrey, the well known founder of the New York Botanical Society, as well as a group of leading physicians who, taking their inspiration from the successful methods of the Lyceum and following the example of the Academy of Medicine of Paris, conceived and developed our own Academy of Medicine.

His mother, Angeline Betts Ferris, daughter of Josiah S. Ferris, a prominent citizen of Peekskill, N. Y. was descended from Geoffrey Ferris who came from Leicestershire, England, in 1666, and settled in Watertown, Mass.

Mr. John S. Browne himself was born in King Street, Greenwich Village, N. Y., December 14, 1854. His earliest instruction was gained at the then well known Scotch Presbyterian School on 15th Street, of which his father was the principal. Later he entered the Leggett School, preparatory for West Point, where, although otherwise highly successful, he did not pass the physical tests and instead of pursuing the intended career at once secured the position of assistant Librarian in the Astor Library where he remained for about three years. Of studious mind and realizing the value of collegiate advantages he continued his education far beyond the customary limit of the graduate in arts. Already familiar with the routine of library work when called to the Academy, and fully informed as to the hopes and ambitions of his sponsors, he envisioned the possibilities of the representative medical institution of the great metropolis, at the outset designated as its true "Medical Center," and entered upon his new duties with full appreciation of the magnitude of the enterprise and of his responsibility to it; and with the clearly expressed determination to create for the Academy the best Medical Library in the world. In this endeavor he had the enthusiastic support of the succeeding groups of officers of the institu-

tion, men who possessed the culture, knowledge and influence to bring about the desired results.

The selection of Mr. Brownne was particularly happy, for he was amply prepared for the position, besides giving abundant promise of development. The salary was meagre for a Librarian, not to mention his other activities, even in those days; but the recognition of his worth suggested the making of a life as well suited to his means as possible for him and for the efficient execution of his many duties. In the agreement made, it was expressly stipulated that he should have suitable living quarters in the building. Being thus provided Mr. Brownne promptly married Miss Julia Seaman, of an old family of Long Island, and in the many succeeding years lived happily with his family in an atmosphere of appreciation and of substantial help, the spirit of which is well expressed in the recent words of one of them: "You know it is not every one who has had the privilege and the honor of being born and brought up in the Academy of Medicine."

Thus he was enabled to devote all possible daytime to the Library itself and to the securing, training, and supervising of its personnel, with the advantage that the Librarian and Manager was always available, fulfilling his multiple duties during the prescribed hours in the Library, and in the evenings arranging for and superintending the conduct of the various meetings, often until late at night. Such long hours would seem to have left little time for other things, but in addition to them, when there were no meetings many of the evening hours were devoted by him to the book-keeping and other necessary details of the business and material management. By diligent pursuance of this routine, conducted with unfaltering zeal, the Academy flourished as only we who shared its history and worked earnestly in its behalf can know.

While recognizing the individual worth of Mr. Brownne's administration and according to him full credit for the many excellencies which he so well achieved, it must be remembered that in these things he enjoyed assistance

of far more than usual value. The Library Committees were carefully selected from among the very best of the earnest and cultured Fellows of the Academy, ever deeply interested in its welfare and ardent in their activities and their support.

The actual executive work was shared by the chief assistant librarian, Mrs. Laura E. Smith, a lady, thoroughly equipped in all that pertained to her position, who for thirty-five years a talented and devoted associate, was by all held in highest esteem.

To further the conduct of material affairs, a practical House Superintendent was needed, and was secured in the person of Mr. Felix Westrom, an efficient aid, and an invaluable adjunct to the general atmosphere and welfare. Thus was completed a working staff of unique character and efficiency, earnest of purpose, harmonious with one another, proud of the institution which they so loyally supported, and universally appreciated. These, throughout the long period of their activity, were the soul and spirit of the place, patiently but surely, with rare wisdom and tact, stimulating its progress and communicating to the entire personnel their self-contained enthusiasm.

With the diligent pursuance of their routine, conducted under the genial management of the Librarian-in-chief, the Academy increased rapidly in volume and importance. Desirable additions to it often appeared for sale, and in the competition for them he frequently out-bid powerful rivals, funds being provided by enthusiastic members or by their friends, in the acquiring of whose attention and generous interest Mr. Browne was particularly successful. The most important acquisition came through the Governors of the New York Hospital, who, in 1898, donated to the Academy the Library of the New York Hospital, numbering 23,000 volumes, a fine collection founded in 1798, and during its last half century under the able direction of its Librarian, Mr. John L. Vandervoort.

This library included the celebrated collection of rare

old books on the history of medicine made by Dr. John Watson, which was the beginning of the Academy's present fine collection of incunabula, greatly valued by Mr. Brownne.

Year by year, with steady increase, the Academy gained. Its reliability was widely recognized, the dignity of its ambition approved, and its value utilized.

Books in considerable number were given by members, among whom was Dr. Purple, an ardent collector. For many years he had gathered complete files of American medical periodicals, until he had acquired the most nearly perfect series in existence. These he presented to the Academy.

Some years before the Academy moved into Thirty-first Street, Dr. Frank P. Foster, editor of the New York Medical Journal, had established a society known as the Medical Journal Association, which had its quarters in 1871 at the Mott Memorial, 64 Madison Avenue, and in 1874 in the building 107 East Twenty-eighth Street, at that time as now occupied by Tiemann and Company. By a friendly arrangement the Journal Association was merged into the Academy, where it at once created for the institution its department of current periodicals.

The growth of the Library, according to the record, eloquently testifies to the character and value of Mr. Brownne's stewardship. On his accession, in 1880, the total number of books was 25,000; upon his retirement in 1926, there were 139,320 books, 98,685 pamphlets and journals subscribed for, making a total of 239,505 titles, in itself alone a splendid fulfillment of his original ambition.

Among many collateral services assumed by Mr. Brownne and suggestions made by him, were several of permanent importance. Not seldom, following the death of various prominent physicians, their widows would apply to him for advice as to the disposal of their collections of books and instruments, often representing the interests of a lifetime. Books of value not already owned by the

Academy were purchased by him; the rest were referred to places where they could be disposed of to advantage. The same course was pursued with the instruments. Among them some were valuable because of original design or of antiquity; others representing old forms, long since disused but having belonged to some distinguished man. These were carefully preserved by Mr. Browne, with the often expressed intent of establishing with them a museum; an idea now being successfully elaborated.

Upon the removal to 43rd Street Mr. Browne inaugurated a Department of Exchange. This soon became an important feature, widely appreciated and utilized. Gifts to other libraries since then have been continuous and there are few which have not received substantial help from the duplicate and triplicate service established. Many boxes were carefully packed by Mr. Browne himself in the basement of the building where most of that material was stored, amid inconvenient conditions.

At the time of the great earthquake in Japan the Medical Library at Tokio was destroyed. Mr. Browne at once busied himself in doing all possible to form a new one and thus without delay to further the uninterrupted progress of medical education. His efforts were successful, for he sent what was virtually a complete equipment. In many other instances the same was done, notably in that of the Lane Library, destroyed in the San Francisco disaster of 1906.

Upon his retirement from active direction Mr. Browne was made Consulting Librarian, residing at Haworth, New Jersey, not far from his two married daughters. With his wife and with them and their families, including two fine grandsons, he enjoyed the quietude of his own home, where among his flowers and books the subsequent years were passed. His health had been impaired by reason of his unremitting activities, and about two years ago it was discovered that his heart was seriously affected. The outlook was unfavorable, but under skillful treatment his life was prolonged far beyond expectation. Weakened

by long-continued over-use of the eyes, he also developed glaucoma, which was operated upon; but subsequently inoperable cataract appeared. He had long wished to write a History of Medicine, especially as relating to New York and more particularly to The New York Academy of Medicine—the latter's influence upon medicine in general and its special influence during the years of his administration. This, unfortunately became impossible on account of failing eyesight and his general physical condition. The loss of his observations upon these events, as well as upon the characteristics of those he had met so intimately among the great ones of that era is irreparable. He had accumulated a mass of material upon the subject, which is preserved.

At the close of his illness and during the last days of his life, surrounded by his family and in the natural clouding of the mind which attended his condition, he constantly recurred to the subject of the library, its books, and the friends who had been his constant companions there, evidently happy in his thoughts of them and in the nearer memories of his well-rounded life.

The record of the Academy during Mr. Brownne's administration was one of steady, uninterrupted advancement, as he had hoped from the beginning. There was no retrogression, nor, from the day of its founding any suspension of its varied activities. With every season these became broader and more indispensable until, with the progress which was demanded by vastly increased detail and more generous space and adequate service, the expansion which had become imperative was met, and the present building inaugurated.

Successfully emerging from the early struggles of its birth and childhood, the Academy had been committed to the care of our friend, who cherished and guided the period of its ever growing youth until, crowning his well accomplished life-work, it was passed on to his successors, amply prepared to advance in the full strength and courage of splendid maturity.

The varied nature of Mr. Browne's interest demonstrates the breadth of his character and mind. He was an Honorary member of the New York Historical Society and of the New York Academy of Sciences. He was, also, a member of the American Association of Medical Librarians, at one time chairman of its executive committee; of the Sons of The Revolution and of various other societies of art and of science.

He was an Elder in the Park Presbyterian Church, New York, and a Republican. His favorite recreations were fishing, hunting and horseback riding.

DAVID BRYSON DELAVAN.

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## RECENT ACCESSIONS TO THE LIBRARY

- Asch, P. Die moderne Therapie der Gonorrhöe beim Manne. 3. Aufl.  
Berlin, Marcus, 1930, 91 p.
- Aschner, B. Klinik und Behandlung der Menstruationsstörungen.  
Stuttgart, Hippokrates-Verlag, 1931, 488 p.
- von Bälz, E. Erwin Bälz; das Leben eines deutschen Arztes in erwachenden Japan.  
Stuttgart, Engelhorn, 1931, 454 p.
- Berg, R. Eiweissbedarf und Mineralstoffwechsel bei einfachster Ernährung.  
Leipzig, Hirzel, 1931, 239 p.
- Bourne, G. An introduction to medical history and case taking.  
Edinburgh, Livingstone, 1931, 195 p.
- Camino Galicia, J. Psiquiatria general. Delirios y delirantes.  
Madrid, Saez, 1930, 203 p.
- Chabanier, H. E. L. and Lobo-Onell, C. Exploration fonctionnelle des reins.  
Paris, Masson, 1930, 569 p.
- Chittenden, R. H. The development of physiological chemistry in the United States.  
N. Y., Chemical Catalog Co., 1930, 427 p.
- Coburn, A. F. The factor of infection in the rheumatic state.  
Balt., Williams, 1931, 298 p.
- Faber, K. H. Nosography; the evolution of clinical medicine in modern times. 2. ed.  
N. Y., Hoeber, 1930, 222 p.
- Garrod, (Sir) A. E. The inborn factors in disease.  
Oxford, Clarendon Press, 1931, 160 p.
- Gesell, A. The guidance of mental growth in infant and child.  
N. Y., Macmillan, 1930, 322 p.
- Glénard, R. Réactions vaso-motrices du foie en clinique.  
Paris, Doin, 1931, 239 p.
- Gini, C.; Boldrini, M.; de Berardinis, L. [et al.] Demografia.  
Torino, Unione Tipografico-Editrice Torinese, 1930, 740 p.
- Guiard, É. La trépanation crânienne chez les néolithiques et chez les primitifs modernes.  
Paris, Masson, 1930, 126 p.
- Halliburton, W. D. and McDowall, R. J. S. Handbook of physiology. 19. ed.  
London, Murray, [1930], 842 p.
- Hapgood, R. L. History of the Harvard Dental School.  
Boston, Harvard Univ. Dent. School, 1930, 343 p.
- Hertzer, A. E. Surgical pathology of the diseases of bones.  
Phil., Lippincott, [1931], 272 p.
- Holmes, G. W. and Ruggles, H. E. Roentgen interpretation. 4. ed.  
Phil., Lea, 1931, 339 p.

- Houstoun, R. A. A treatise on light. [6. ed.]  
London, Longmans, 1930, 494 p.
- Humphris, F. H. and Stuart-Webb, R. E. Physiotherapy.  
London, Cape, [1930], 354 p.
- Isaacs, S. Intellectual growth in young children.  
N. Y., Harcourt, 1930, 370 p.
- Jung, C. G. Psychologische Typen.  
Zürich, Rascher, [1930], 724 p.
- Kilduffe, R. A. The clinical interpretation of blood examinations.  
Phil., Lea, 1931, 629 p.
- Kirk, J. B. Public health practice in the tropics.  
London, Clurehill, 1931, 498 p.
- Klotz-Guérard, J. La thérapeutique par voie nasale.  
Paris, Les Presses Universitaires de France, [1930], 158 p.
- Lebensproblem (Das) im Lichte der modernen Forschung. Hrsg. von H. Driesch.  
Leipzig, Quelle, 1931, 461 p.
- Lockyer, C. H. J. The Lockyer collection of obstetric and gynaecological specimens.  
London, Bale, 1930, 297 p.
- Menge, E. J. v. K. A survey of national trends in biology.  
Milwaukee, Bruce, [1930], 156 p.
- Miller, E. Modern psychotherapy.  
London, Cape, [1930], 131 p.
- Mühl, A. M. Automatic writing.  
Dresden, Steinkopff, 1930, 214 p.
- Neuburger, M. Essays in the history of medicine.  
N. Y., Medical Life Press, 1930, 210 p.
- Osgood, E. E. and Haskins, H. D. A textbook of laboratory diagnosis.  
Phil., Blakiston, [1931], 475 p.
- Perutz, A. Allgemeine Therapie der Hautkrankheiten.  
Wien, Springer, 1930, 123 p.
- Peter, L. C. The principles and practice of perimetry. 3. ed.  
Phil., Lea, 1931, 315 p.
- Pincussen, L. Photobiologie; Grundlagen, Ergebnisse, Ausblicke.  
Leipzig, Thieme, 1930, 543 p.
- Piney, A. Recent advances in haematology. 3. ed.  
London, Churchill, 1931, 348 p.
- Preventive management: mental hygiene in industry. Edited by H. B. Elkind.  
N. Y., Forbes, [1931], 234 p.
- Pryde, J. Recent advances in biochemistry. 3. ed.  
London, Churchill, 1931, 393 p.
- de Quervain, F. Spezielle chirurgische Diagnostik. 9. Aufl.  
Leipzig, Vogel, 1931, 916 p.
- Rackemann, F. M. Clinical allergy, particularly asthma and hay fever.  
N. Y., Macmillan, 1931, 617 p.

- Rood, F. S. and Webber, H. N. Anaesthesia and anaesthetics.  
N. Y., Wood, 1930, 292 p.
- Saunders, J. T. and Manton, S. M. A manual of practical vertebrate morphology.  
Oxford, Clarendon, 1931, 220 p.
- Scherber, G. Beiträge zur Lösung des Krebsproblems.  
Wien, Perles, 1930, 158 p.
- Schürmann, P.; Pflüger, H. and Norrenbrock, W. Die Histogenese ektomesodermaler Mischgeschwülste der Mundhöhle.  
Leipzig, Thieme, 1931, 94 p.
- Scemann, G. Histobiologie der Lungenalveole.  
Jena, Fischer, 1931, 88 p.
- Socialization (The) of medicine. Compiled by Edith M. Phelps.  
N. Y., Wilson, 1930, 190 p.
- Still, G. F. The history of paediatrics.  
London, Milford, 1931, 526 p.
- Tarugi, N. Trattato di chimica bromatologica.  
Milano, Vallardi, 1930, 460 p.
- Terrill, H. M. and Ulrey, C. T. X-ray technology.  
N. Y., Van Nostrand, 1930, 256 p.
- Trial of Frederick Guy Browne and William Henry Kennedy.  
Edinburgh, Hodge, [1930], 218 p.
- Vidal Jordana, G. Trastornos nutritivos del lactante.  
Barcelona, Marín, 1930, 288 p.
- Walscheid, A. J. Abdomino-pelvic diagnosis in women.  
St. Louis, Mosby, 1931, 1000 p.
- Wickes, (Mrs.) F. G. The inner world of childhood.  
N. Y. Appleton, 1930, 379 p.
- Young, J. K. Handbook of anatomy. 7. ed.  
Phil., Davis, 1930, 460 p.
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# PROCEEDINGS OF ACADEMY MEETINGS

## APRIL

### STATED MEETINGS

Thursday Evening, April 2, at 8:30 o'clock

*Program presented in coöperation with the*

SECTION OF MEDICINE

and the

NEW YORK GASTRO-ENTEROLOGICAL SOCIETY

#### I. EXECUTIVE SESSION

Election of Fellows

#### II. PAPERS OF THE EVENING

a. The mechanism of gastric secretion, B. P. Babkin, McGill University (by invitation)

b. The motor mechanism of the large bowel, A. J. Carlson, University of Chicago, Department of Physiology (by invitation)

Discussion, Martin E. Rehfus, Philadelphia (by invitation), Leon T. LeWald, John L. Kantor, Albert F. R. Anderson

#### III. EXECUTIVE SESSION—Section of Medicine

Nomination of officers and one member of advisory committee

Thursday Evening, April 16, at 8:30 o'clock

#### THE SEVENTH HARVEY LECTURE

"The Use of Cold in the Analysis of Physiological Function"

SIR WILLIAM HARDY

Food Investigation Board

of the

Department of Scientific and Industrial Research

and

Low Temperature Research Station

Cambridge, England

ALFRED E. COHN, President, Harvey Society

DAYTON J. EDWARDS, Secretary, Harvey Society

#### SECTION MEETINGS

##### SECTION OF SURGERY

Wednesday Evening, April 1, at 8:30 o'clock

(Please note change in date)

#### ORDER

#### I. READING OF THE MINUTES

#### II. PRESENTATION OF CASES

a. Splenectomy for purpura hemorrhagica, Edward J. Donovan

b. 1. Meningocele—6 years after operation

2. Spina bifida—6 years after operation

3. Mesenteric thrombosis—intestinal resection—2 years after operation, Irwin E. Siris

c. Two cases demonstrating a method of removing a semilunar cartilage of knee joint, Russel H. Patterson

### III. EXECUTIVE SESSION

a. Nomination of officers and one member of Advisory Committee

b. Report of committee on proposed new classification of membership in the Academy and qualifications for Fellowship in Surgery

c. Discussion opened by John A. Hartwell

#### SECTION OF DERMATOLOGY AND SYPHILOLOGY

Tuesday Evening, April 7, at 8:30 o'clock

##### ORDER

### I. EXECUTIVE SESSION

a. Reading of the Minutes

b. Nomination of officers and one member of Advisory Committee

### II. PRESENTATION OF CASES

a. Cases from Skin and Cancer Hospital

b. Miscellaneous cases

### III. GENERAL DISCUSSION

#### SECTION OF PEDIATRICS

Thursday Evening, April 9, at 8:30 o'clock

##### ORDER

### I. EXECUTIVE SESSION

Nomination of officers and one member of Advisory Committee

### II. PAPERS OF THE EVENING

The breathing of normal new born infants, Douglas Murphy, Philadelphia (by invitation)

Discussion opened by Walter Lester Carr

III. The treatment of convulsant poisons with the aid of the Drinker respirator, Joseph Stokes, Philadelphia (by invitation)

Discussion opened by Henry B. Wightman (by invitation)

IV. Congenital heart disease, clinical analysis of 82 cases with autopsy findings, Clifton B. Leech, Providence (by invitation)

Discussion opened by Clarence de La Chapelle, Charles Hendee Smith

#### SECTION OF NEUROLOGY AND PSYCHIATRY

Tuesday Evening, April 14, at 8:30 o'clock

##### ORDER

### I. EXECUTIVE SESSION

a. Reading of the Minutes

b. Nomination of officers and one member of Advisory Committee

### II. CLINICAL PRESENTATIONS

a. An initial visit, Philip R. Lehrman

b. Complementary neurosis in a married couple, Clarence P. Oberndorf

### III. PAPER OF THE EVENING

The present status of psychoanalysis as a psychologic and therapeutic system, Franz Alexander, Visiting Professor of Psychoanalysis, University of Chicago (by invitation)

Discussion, J. Ramsay Hunt, Smith Ely Jelliffe, A. A. Brill

IV. GENERAL DISCUSSION

SECTION OF GENITO-URINARY SURGERY

Wednesday Evening, April 15, at 8:30 o'clock

ORDER

I. EXECUTIVE SESSION

- a. Reading of the Minutes
- b. Nomination of officers and one member of Advisory Committee

II. PRESENTATION OF CASES

- a. Kidney lesion simulating solitary cyst, Paul W. Aschner
- b. Cyst of the prostate, Allen M. Margold (by invitation)
- c. Radical operation for carcinoma of the penis, Herbert Willy Meyer

III. PAPERS OF THE EVENING

- a. The surgical treatment of nephritis, Irving Simons
- b. The use of surgical endothermy in suprapubic prostatectomy, Paul W. Aschner

Discussion, J. Sturdivant Read

IV. GENERAL DISCUSSION, Joseph McCarthy, Oswald Lowsley, Paul Aschner, Leon T. Le Wald, Leo L. Michel

SECTION OF OPHTHALMOLOGY

Monday Evening, April 20, at 8:30 o'clock

ORDER

I. EXECUTIVE SESSION

- a. Reading of the Minutes
- b. Nomination of officers and two members of Advisory Committee

II. PRESENTATION OF CASES

- a. A case of voluntary nystagmus, Hugh S. McKeown (by invitation)
- b. 1. An operation for epiphora
2. Subconjunctival hemorrhage as a diagnostic sign in intraocular foreign bodies, Benjamin Friedman (by invitation)

III. DEMONSTRATIONS

- a. An abbreviated method of muscle resection, Sigmund A. Agatston
- b. The development of the cornea in the chick embryo, George F. Laidlaw

IV. PAPER OF THE EVENING

Significant hemorrhagic retinal lesions occurring in bacterial endocarditis—Roth's spots (lantern slides), William Brown Doherty, Max Trubek (by invitation)

Discussion, Alexander Lambert, Emanuel Libman

V. GENERAL DISCUSSION

SECTION OF MEDICINE

The regular meeting was not held on April 21 for the reason that the Section of Medicine and the New York Gastro-Enterological Society presented the Stated Meeting of April 2.

JOINT MEETING  
of the  
SECTION OF OTOTOLOGY  
and the  
SECTION OF LARYNGOLOGY AND RHINOLOGY  
Wednesday Evening, April 22, at 8:30 o'clock

ORDER

I. EXECUTIVE SESSION

- a. Nomination of officers and one member of Advisory Committee
- b. Report of Advisory Committee on proposed new classification of membership in the Academy and qualifications for Fellowship in Otology and Rhino-Laryngology
- c. Consolidation of the Section of Otology and the Section of Laryngology and Rhinology

II. PAPERS OF THE EVENING

SYMPOSIUM ON "PNEUMOCOCCIC AND STREPTOCOCCIC MENINGITIS"

- a. Otological aspect, James G. Dwyer
- b. Rhino-laryngological aspect, Lee M. Hurd
- c. Prophylaxis and treatment, John A. Kolmer, Research Institute of Cutaneous Medicine, Philadelphia (by invitation)

Discussion opened by Andrew A. Eggston, Ira Cohen, Samuel J. Kopetzky

SECTION OF ORTHOPEDIC SURGERY  
Friday Evening, April 24, at 8:30 o'clock  
(Please note change in date)

ORDER

I. EXECUTIVE SESSION

- a. Reading of the Minutes
- b. Nomination of officers and one member of Advisory Committee

II. PAPERS OF THE EVENING

- a. The operative treatment of hallux valgus, Samuel Kleinberg
- b. A simple and effective method of bone suture, especially applicable to the bones of the forearm, Isadore Zadek
- c. Therapeutic and physical properties of ultraviolet irradiation of petrolatum, Eugene H. Eising

III. GENERAL DISCUSSION

SECTION OF OBSTETRICS AND GYNECOLOGY  
Tuesday Evening, April 28, at 8:30 o'clock

ORDER

I. READING OF THE MINUTES

II. PAPERS OF THE EVENING

- a. The value of external cephalic version in transverse and breech presentations, Oskar Glassman (by invitation)

Discussion opened by G. H. Ryder, Abraham J. Rongy, Samuel J. Scadron, Hervey C. Williamson

- b. The Elliott treatment in pelvic inflammation, Frederick C. Holden, Emily D. Barringer, Henry C. Falk, Max S. Rohde, Mortimer N. Hyams, Robert Gutierrez
- c. Computation and standardization of the maternal mortality rate, R. J. Lowrie (by invitation)

III. GENERAL DISCUSSION

IV. EXECUTIVE SESSION

- a. Nomination of officers and one member of Advisory Committee
- b. Discussion of the qualifications for Fellowship in the Section of Obstetrics and Gynecology.

SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE

Under the auspices of

THE NEW YORK ACADEMY OF MEDICINE

Monday, April 20, at 5 o'clock

ANNUAL SCIENTIFIC AND BUSINESS MEETING

- I. A Method for Preparing an Active Adrenal Cortex Extract, R. L. Zwemer, F. J. Agate, Jr., and H. A. Schroeder (introduced by P. E. Smith)
  - II. A Blood-Chemical Test for Adrenal Cortex Extracts, R. L. Zwemer and R. C. Sullivan (introduced by P. E. Smith)
  - III. Continuous Pancreatic Secretion, B. N. Berg and T. F. Zucker
  - IV. Antagonistic Action Between Parathormone and Irradiated Ergosterol in Experimental Fibrous Osteodystrophy of Guinea Pigs, A. J. Abeloff and I. P. Sobel (introduced by E. H. Fishberg)
  - V. Action of Thyroxin on Tissue Metabolism, Aleita Hopping (introduced by E. L. Scott)
  - VI. Effect of Adrenal Cortical Hormone upon Respiratory Metabolism of Adrenalectomized Cats, W. W. Swingle, J. J. Piffner and B. Webster
  - VII. Solubility of Human Gall Stones in Dog Bile, L. Bauman and G. O. Spanner
  - VIII. Amino Acids as the Only Nitrogen Source During Growth and Differentiation, O. Hoffman and F. Gudernatsch (introduced by A. J. Goldforb)
  - IX. Pharmacology of *Ruvettus pretiosus*, or "Castor-Oil Fish," D. I. Macht and J. Barba-Gosc
  - X. Production of anatomical lesions in the isolated organ, Jean R. Oliver
- Please note change of date of meeting to Monday, April 20, at 5 p. m.  
Dinner to follow.

PEYTON ROUS, President

A. J. GOLDFORB, Secretary



THE NEW YORK ROENTGEN SOCIETY  
In Affiliation with  
THE NEW YORK ACADEMY OF MEDICINE  
Monday Evening, April 20

ORDER

- I. 8:30 P. M.  
Demonstration of interesting cases and roentgenograms
- II. 9:00 P. M.
  - a. Some roentgenological lesions in the long bones of growing individuals in clinical and experimental poisoning by lead
  - b. The roentgenological changes in the bones in the hemolytic changes in childhood; a clinical and roentgenological correlation
  - c. Roentgenograms of interesting cases from the Babies' Hospital, John Caffey
- III. GENERAL DISCUSSION  
To be opened by Leopold Jaches, Nathan Rosenthal
- IV. EXECUTIVE SESSION  
ROSS GOLDEN, President  
J. BENNETT EDWARDS, Secretary

NEW YORK PATHOLOGICAL SOCIETY  
In Affiliation with  
THE NEW YORK ACADEMY OF MEDICINE  
Thursday Evening, April 23, at 8:30 o'clock

ORDER

- I. PRESENTATION OF PAPERS
  - a. Two unusual heart lesions, Max Lederer
  - b. A case of endocarditis due to *Bacillus acidi lactici*, Lewis Dickar (by invitation)
  - c. The pathology of Bartonella muris anemia, J. Marmorston-Gottesman (by invitation), David Perla
  - d. The compensatory phenomena following splenectomy in albino rats, David Perla, J. Marmorston-Gottesman (by invitation)
- II. EXECUTIVE SESSION  
LEILA C. KNOX, President, St. Luke's Hospital  
BERYL H. PAIGE, Secretary, The Babies' Hospital

## FELLOWS ELECTED MAY 7, 1931

Julius Arnovich.....	200 West 111 Street
Gordon M. Bruce .....	180 Ft. Washington Avenue
Henry G. Bullwinkel.....	30 East 76 Street
Alvin F. Coburn.....	622 West 168 Street
Charles W. Depping.....	17 West 54 Street
Emil A. Falk.....	44 East 76 Street
Philip Finkle.....	1185 Park Avenue
Clarence C. Fuller .....	565 Park Avenue
Sol W. Ginsburg.....	39 West 55 Street
Arnold Koffler.....	302 West 86 Street
Laura Miller.....	17 West 54 Street
Pro. V. Prewitt.....	885 Park Avenue
Fred H. Voss.....	69 Spring Street, Kingston
Siegfried Wachsmann .....	565 Manhattan Avenue
Preston A. Wade.....	1045 Park Avenue

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## DEATHS OF FELLOWS OF THE ACADEMY

HERMAN ARTHUR HAUBOLD, M.D., 22 West 9th Street, New York City; graduated in medicine from Bellevue Hospital Medical College, New York City, in 1889; elected a Fellow of the Academy February 4, 1897; died, May 5, 1931. Dr. Haubold was a Fellow of the American Medical Association, a member of the County and State Medical Societies, a member of the Society of Alumni of St. Vincent's Hospital and Consulting Surgeon to Harlem, Broad Street, Nassau and Mineola Hospitals, New York, also to the Memorial Hospital, New London, Connecticut.



# BULLETIN OF THE NEW YORK ACADEMY OF MEDICINE

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## ANNUAL GRADUATE FORTNIGHT

### SERUM THERAPY\*

WILLIAM H. PARK

Director of Laboratories, Department of Health

We have just heard the paper by Dr. Zinsser taking up from a research point of view the nature of antibodies. I have been asked to consider antibodies from another standpoint, by giving a short paper on the utilization of antibodies in the treatment of communicable diseases. As he has already told you, antibodies divide themselves into two distinct classes, the antitoxic and the antibacterial antibodies. Most of the diseases in which we use antibodies for curative purposes are either due to bacteria causing definite extracellular toxins or to those in which the injury seems to be due chiefly to the bacterial substance. It is possible that undetermined intracellular toxins may play a more or less important part in some of them. The hemolytic streptococci, exciting scarlet fever, erysipelas, puerperal fever, septic sore throat and possibly other infections produce poisoning through exotoxins and endotoxins.

The antitoxic sera are more potent than the antibacterial sera, and when we treat cases having diphtheria and tetanus, there is no difficulty in giving sufficient antitoxin to be effective if we reach the cases early enough.

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\* Delivered October 29, 1930.

With the antibacterial sera we have to utilize the body fluids and cellular elements to aid the antibodies of the antiserum to destroy the microorganisms and this limits the effective treatment of the cases.

The first disease I shall touch upon is: *Diphtheria*. There is probably little new that I can say to you on the use of antitoxin in this disease. In a case of diphtheria we know that the toxin is situated in the region of the upper respiratory tract which is attacked, and that the toxin unites first with the adjacent tissue and then the excess passes by the lymphatic channels to the blood and so is distributed throughout the body. We know from experimental investigation, that there is a period of a few hours after the toxin has come in contact with the cells that the union is incomplete and that the toxin can still be neutralized by the antitoxin. When, however, union has taken place, little or no good results from the use of antitoxin. If for instance, we give a rabbit an intravenous injection of ten fatal doses of diphtheria toxin, we cannot neutralize that toxin if we delay the giving of antitoxin for more than one and a half hours. Fortunately in an ordinary case of diphtheria a very moderate amount of toxin escapes being fixed by the local tissues and passes to the blood within the first 24 hours. In considering the dosage of antitoxin we must keep in mind that it is not the amount of toxin in the body which determines the amount of antitoxin to be given. If all the toxin in the most malignant case could be extracted and placed in contact with antitoxin less than 100 units of antitoxin would neutralize it. We give much larger doses than this because the antitoxin after entering the blood gradually passes through the walls of the capillaries to be dispersed to all regions of the body. As only a slight percentage of the antitoxin in the blood passes out through the capillaries within a limited period of time, we realize the wisdom of giving a great excess, so that in a short time the amount which passes to the tissues will be sufficient to neutralize any unattached toxin. The need of speed in severe cases makes us choose different

methods for administering antitoxin in mild, moderate and severe cases. In mild cases an intramuscular or even a subcutaneous injection of a moderate amount is good treatment, in severe cases an intravenous combined with intramuscular injection is much more effective. In very severe and toxic cases an intravenous injection is absolutely indicated. The serum when given should be fairly warm.

The objection to the intravenous injection is that there is a slightly greater danger of severe shock, perhaps even fatal anaphylactic shock. This occurs possibly once in 20,000 cases, while in intramuscular injections, probably only once in 60,000. If, however, we inquire as to the history of asthma and as to whether previous injections of horse serum have been given, and neither of them is true and if we also give the serum very slowly, there is almost no chance of serious consequences. Even if a history of asthma or previous serum injections is obtained, it is probably wise, in a severe case to give an intravenous injection, but it should be done very slowly. We may possibly at some time cause a death by giving it intravenously in these cases, but meanwhile we will have saved many who would otherwise die. In the following table is given our present practice.

#### AMOUNT OF ANTITOXIN REQUIRED IN THE TREATMENT OF A CASE

	<i>Mild Cases</i>	<i>Moderate</i>	<i>*Severe</i>	<i>*Malignant</i>
Children up to 60 lbs. in weight (under 15 years of age) .....	{ 3,000 units to 5,000 units	5,000 units to 10,000 units	10,000 units to 20,000 units	15,000 units to 30,000 units
Older children and adults 60 lbs. and over in weight .....	{ 3,000 units to 5,000 units	10,000 units to 15,000 units	20,000 units to 40,000 units	30,000 units to 60,000 units

Cases of laryngeal diphtheria, moderate cases seen late at the time of the first injection, and cases of diphtheria occurring as a complication of the exanthemata should be classified and treated as "severe" cases.

In all cases a single dose of the proper amount, as indicated in the schedule, is recommended. No further injections of antitoxin are necessary.

It is recommended that the methods of administration be as follows:

Mild Cases—Intramuscular.

Moderate Cases—Intramuscular.

Severe Cases—Intravenous or partially intramuscular.

Malignant Cases—Intravenous.

\*When given intravenously the smaller amounts stated.

There is still doubt in the minds of many physicians whether a single dose of antitoxin is sufficient. There is no question that usually twelve hours after the first injection of antitoxin, many cases still remain very sick and that if a second dose is given, they may in the next 12 hours become much better. If, however, one does not give the second injection, one will just as often find them improved. It takes a certain length of time for the antitoxin to neutralize the toxin in the tissues and for the inflammatory reaction to begin to subside. Some probably do not fully appreciate the fact that the antitoxin in an intramuscular injection is only gradually passed out to the blood. At the end of 24 hours only about sixty per cent has been absorbed, and it is two days before it is almost entirely absorbed. It is as if repeated tiny injections were being given intravenously every half hour for two days. There is no harm in repeating the injections, but if a sufficient dose has been given at the first injection, there is no advantage, while there is distinct harm in giving half the amount needed at the first injection and supplementing this with a second dose twelve hours later.

One can usually detect those in whom injection of serum will be followed by the development of untoward symptoms by finding out whether the mucous membrane of the eyelid reacts to serum. We place a drop of the serum on the eyelid and wait for 15 minutes. If no reaction develops, there is little probability of its following a dose of serum. If a reaction does develop we use great caution in giving a therapeutic dose.

The question as to how much we can desensitize a patient is still debatable. If 5 c.c. of serum are given subcutaneously or intramuscularly and no reaction results, we are almost certain that no reaction will develop if we repeat the dose. If we double it, however, we may get a reaction. There is some degree of desensitization, but it is not at all something which can be relied upon. The dosage of antitoxin varies between the following limits.

The use of antitoxin to produce passive immunization against diphtheria is exceedingly successful. I doubt whether any case of diphtheria has ever developed within a week after a person had received a thousand units of antitoxin. We must remember that this passive immunity is not lasting. It is quite different from that which develops after toxin-antitoxin or toxoid. It is interesting to note that in the 35 years which have elapsed since the discovery of antitoxin and the twelve years since the general use of toxin-antitoxin or toxoid, that the death rate has been reduced from 150 to about 3.

Undoubtedly, the severity and mortality of diphtheria have lessened considerably during these 35 years owing to general health measures, but the most careful scrutiny of the facts makes us confident that much of it is due to diphtheria antitoxin and to toxin-antitoxin.

This is the next disease that I wish to discuss. *Tetanus* :—Every clinical case of tetanus is a late one. There is in the infected wound no suggestion of tetanus infection. It is only when the nervous and muscular systems have become involved that we realize that tetanus toxin has been acting for some time. There are only two proper methods of administering antitoxin in tetanus. One is through intravenous injections, the other through intraspinal injections. These two methods should be combined. Experimental evidence shows us that an animal can be saved by an intraspinal injection when it cannot be saved by an intravenous injection and the majority of those who have had most to do with the treatment of tetanus, believe that there is convincing evidence that the same is true for the treatment of human beings. We have just stated that in diphtheria we give only one dose of antitoxin. In tetanus, we give several doses. We have some evidence that it is advisable to keep the antitoxic content of the spinal fluid and of the blood at a high level. It is possible that the first injection of the antitoxin both intraspinally and intravenously accomplishes nearly all the good that successive treatments accomplish. However, the disease is such a



dreadful one that we want to do everything that seems to be of possible avail. We must remember that in the severe and rapidly advancing cases, antitoxin will probably be given too late to do any good. It is in the moderate cases which would probably be fatal without treatment that antitoxin shows its best effect. Generally we begin then by giving an intraspinal injection of 10,000 to 15,000 units and an intravenous injection of the larger amount. In twelve hours we give another intravenous injection and in 24 hours a second intraspinal injection. If the case does not seem greatly improved, we continue an intraspinal injection every day for two or three days. After ceasing to give intraspinal injections we give a dose of antitoxin intramuscularly every two or three days until the case has recovered or died. It is probable that any case that receives 100,000 units of antitoxin properly administered has obtained all the value from antitoxin which it is possible to give. The City freely gives 100,000 units for a case, after that it expects payment for the antitoxin. We have practically no requests for the larger amounts when payment is insisted upon. We must always remember that the most important fact in the treatment of tetanus is that every minute of delay is important. The use of preventive inoculations is constantly increasing. They are advised wherever there is either a small or large ragged wound which may have been infected with either dirt or dust. One thousand to 1500 units are given subcutaneously and repeated at seven day intervals until the wound is practically healed. When first seen the wound should be thoroughly cleaned and all foreign matter removed.

*Scarlet Fever*:—This infection is due to strains of hemolytic streptococci. These produce injury through both extracellular and intracellular toxins. Scarlet fever antitoxin serum is obtained from horses injected with a strain of a maximum range of toxin production. The horse should respond markedly to all its different toxins. Such a serum has a marked neutralizing effect on the toxin in the patients during the first few days of the disease in the great majority

of cases of infection. The strains used by us are the famous Dochez N. Y. 5 strain and our number 2<sup>2</sup>. These strains though belonging to different immunological groups produce much the same toxins. Both of these strains are used in the injections of our horses to obtain antiscarlatinal serum. And yet while we are getting fine results with this serum in the treatment of most of our severe scarlet fever cases, in an occasional case we seem to get no response at all. This we believe to be due to the fact that these cases are due to different types of streptococci. We are making a collection of the strains of hemolytic streptococci from these cases and are studying their toxins and their antigenic powers, so as to determine their immunological characteristics.

The question of the worth of the bacterial antibody in scarlet fever serum is still largely a matter of theory. We are injecting the whole organisms intravenously into our horses as well as the toxin subcutaneously and we are concentrating and purifying by a method that allows both antibodies, that is, antitoxin and antibacterial antibody, to remain in our final product, but while we believe it is of real value we are not yet sure how much good it does in scarlet fever cases. We do know that bacterial antibodies must be of the same protective type that is causing the disease. This type always corresponds with the agglutinative type. This bacterial type of antibody is a narrower type than the antitoxic type. While in scarlet fever the presence of an antibacterial type that is the same as that of the infecting strain may be of importance in lessening danger from the invasion of the organism, we are sure theoretically that it is of extreme importance in the treatment of erysipelas and other diseases where the hemolytic streptococcus itself invades the tissues.

The serum should have an antitoxic potency of at least 400 units per c.c. The dose in moderate cases is from 10,000 to 15,000 units intramuscularly or 3000 to 5000 intravenously and in severe cases 5000 to 10,000 units are given intravenously. We have lately been trying to give

only 3000 intravenously for the first dose following with a larger amount in 3 to 12 hours. We have had no bad reactions when the serum was given in this way. If the temperature rises after falling and the rash is still present, repeat the injection. In mild cases in which the temperature is less than  $102^{\circ}$  we do not advise the use of serum, because of the probability of serum sickness following the injection. For some reason antiscarlatinal serum even after being refined is apt to produce serum sickness. *Erysipelas*:—In this disease the types of streptococci are more variable than in scarlet fever. We have had very little personal experience with the use of antitoxic serum, but from the literature and from personal communications we believe that good results are obtained from its use. The antitoxin must match the toxin. This is secured by injecting the horses with toxin obtained from several types. The dosage is the same as in scarlet fever. When an antierysipelas serum is not available an injection of antiscarlatinal serum will usually give equally good results.

*Pneumonia*:—In diseases due to the pneumococcus we have as yet only an antibacterial serum. Many attempts have been made to demonstrate an extracellular toxin. These so far have not given definite results. The great difficulty in the use of antipneumococcus serum is the fact that the pneumococci divide into so many types. We have now 28 specific types of which about six are prevalent in adults and about 10 in children. As undoubtedly you all know, Types I, II and III have been considered the dominant types in adult pneumonias due to pneumococci. Until recently the pneumococci had been grouped as Types I, II and III and Group IV. Many physicians have not realized that Group IV was simply a name given to the unclassified pneumococci.

In our work upon pneumonia at the Bellevue and Harlem Hospitals, we found that many cases of adult pneumonia were due to several other types. This led Miss Cooper in the Research Laboratories of the Department of Health to classify these pneumococci previously placed in

Group IV, and this led to the development of the numerous types now numbering as stated, 28.

At the present time we only have a supply of antipneumococcus serum for Types I and II. Antiserum for the other types will in time be provided, but at first a careful study must be made as to the value of the serum in the different types and to what extent we can produce polyvalent serums. The usual way of deciding whether a case of pneumonia requires serum and the quantity of serum is to determine the severity of the case. A case with a high temperature and toxic conditions is given a preliminary dose of about 5000 units of a polyvalent Type I and Type II serum. If there is no deleterious reaction to the serum within the course of one or two hours, an additional dose of 15,000 units is given. About every six hours during the first day, an additional 20,000 units of the antiserum is injected.

By far the best method of giving either unrefined or refined antibodies is the intravenous. Intramuscular injections are of value but the slowness of the absorption of serum is a great disadvantage. On the second day if a crisis has not already developed, the serum treatment is continued. At the end of this time the case has either recovered or the value of serum is very doubtful and owing to the expense and the limitation of the supply, the doses of serum are very apt to be discontinued. However, if the case is doing fairly well, but has not recovered, smaller doses of serum may be continued. As a general thing larger doses of serum are required in Type II cases of pneumonia than in Type I cases. The average amount given in Type I cases during the first 24 hours is about 100,000 units while in Type II cases 200,000 units may properly be given.

At the present time the antipneumococcus serum is being refined. Dr. Felton at the Harvard University laboratory was the first one to give us a practical refined antibody

solution which when injected made only occasional chills. Since then Dr. Banzhaf in the Research Laboratory of the Health Department has made equally good preparations by different methods. The present refined antibody solution seldom gives a chill and is seldom followed by serum sickness. The strength of the refined antibody solution is usually between 1000 and 2000 units per c.c. The unrefined serum is supplied by different biological plants in strengths of from 100 to 600 units per c.c. The Government minimum standard requires only 100 units per c.c. and if the units are not printed on the label, the probability is that the anti-pneumococcus serum is of the minimum standard.

The research work done by Dr. Felton and by Miss Cooper as well as the clinical results demonstrate that a unit of refined serum has practically at least all the advantages of a unit of unrefined serum. The purified antibody has the greater advantage of producing many less chills and much less sickness than the unrefined. The disadvantage is that the refined serum must always cost about twice as much as the unrefined because of loss in its preparation and the cost of labor.

The results obtained at the Harlem Hospital in the service of Dr. Jesse G. M. Bullowa and at the Bellevue Hospital under the direction of Dr. Russell L. Cecil have proven in my mind beyond all doubt the great value of Type I serum in Type I cases and the considerable value of Type II serum in Type II cases. Unless the pneumonias are typed at the earliest possible moment we may be giving serum unnecessarily in about two-thirds of the cases. The dose of serum or antibody should be warmed and given very slowly, about fifteen minutes is required.

*Poliomyelitis*:—For a number of years serum taken from convalescent cases of this disease has been used therapeutically in early cases. Recently in the Research Laboratories, an antiserum has been prepared in horses which is equivalent in value to that obtained from convalescent

cases of the human disease. This serum has been refined by Banzhaf so that it is about three to four times the strength of convalescent serum. Almost everyone is agreed that the serum does no good in cases after paralysis has developed. The majority believe that the serum is of value when given in the pre-paralytic stage of the disease. The difficulty in determining just what advantage the serum treatment gives is founded on the fact that it is very difficult to have controls, because of the great fear of the disease in the minds of people. Every one wants to try the serum if it may possibly do good. Although some doubt the value, the majority believe that the proof is sufficient to make this a suitable treatment.

Dr. Lloyd Aycock in Boston working with the Antipoliomyelitis Commission has had the greatest experience with the serum treatment and is its most enthusiastic supporter.

Two years ago the following treatment was suggested by a committee of the Academy of Medicine. At once and simultaneously 20 c.c. of human convalescent serum are introduced intraspinaly and 20 c.c. in addition intravenously or intramuscularly. On the following two days 20 c.c. more are given intramuscularly or intravenously on each day. Recommendations for the past year were the same but there was some sentiment towards the elimination of intraspinal therapy by some of the physicians. Our experience, however, with animal inoculations makes us believe that at least one intraspinal injection is very desirable.

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# FACTS AND FALLACIES CONCERNING FOREIGN PROTEIN AND VACCINE THERAPY\*

ERNEST E. IRONS

Clinical Professor of Medicine, Rush Medical College,  
University of Chicago

Methods of treatment of disease, like styles and fabrics of dress, change from year to year and decade to decade and in both, even a brief historical review will demonstrate a continued repetition of older practices somewhat modified to meet new conditions and modes. In matters of dress, which vary from long to short and back again, the original object of clothing to protect the body from cold and injury seems at times to be lost sight of and in medicine newly observed or striking effects lead to the revival or popularization of remedies without due regard to ultimate results, on the assumption that these effects are necessarily beneficial to the patient. The occurrence of the changes is evident; their value to the patient requires careful consideration. The ease of use of the hypodermic needle which makes possible the parenteral introduction of proteins into the body has led to widespread and often uncritical use of this method in the treatment of all manner of conditions and to the drawing of clinical conclusions often without consideration of the natural history of the diseases treated.

Clinical as well as laboratory opinions concerning the method of action and ultimate results to the patient of the parenteral injection of foreign protein, differ widely. Some clinicians use protein shock therapy extensively and believe it to be useful; others are firmly convinced of its uselessness or that the dangers outweigh the possible benefits to be obtained. I must admit that I have some fairly definite opinions, but I will ask you to join with me in

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\*Delivered October 30, 1930.

endeavoring to lay aside our opinions and consider such of the evidence as it may be possible to present in a few minutes. No matter whether we as a jury can bring in an agreed verdict, or as seems much more probable fail to agree and be discharged, we may gain something by hearing the arguments and what is more important perhaps secure a better appreciation of what is required in the formulation of clinical opinion as to the value of a remedy.

In the study and attempted therapy of infectious disease of the past 40 years, chief emphasis has been on the specific relationship of the cause of the disease and its proposed remedy. The early success of diphtheria antitoxin, and the conceptions of most workers, influenced greatly by the teachings of Ehrlich, tended to direct therapeutic efforts along specific lines, and when treatment by antisera or vaccines was attempted, the causative organism of the disease was used. When specific vaccines failed to yield results expected, it was thought that perhaps by using a vaccine prepared from the identical organism causing the disease in the patient (autogenous) better results might be obtained.

From 1906, the date of Wright's introduction of vaccine treatment, the number of papers on vaccines in medical journals constantly increased until it reached a formidable volume about 1912. From this time on, interest in this form of treatment declined, and the number of papers on vaccine therapy recorded by the *Index Medicus* steadily shrank until by 1923 they formed but a small part of the articles listed. In 1923 Dr. Hektoen\* and I undertook by questionnaire to ascertain the opinion of practising physicians with respect to the use of vaccines. We received replies from 1519 physicians, the groups including members of the special societies of the Congress of American Physicians and Surgeons, physicians in the larger cities of Michigan, physicians of Indianapolis and physicians of

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\*Hektoen, L. and Irons, E. E., *Journal A. M. A.*, XCII, p. 861, 1929.



New York and Brooklyn. The replies from each of the four groups were in substantial agreement and indicated that the use of vaccines of various sorts had decreased from a widespread use in the years centering around 1912 to a relatively small percentage in 1923. Excluding hearsay reports, we obtained records of 140 instances of harmful results including a number of cases in which death was considered due to the use of vaccines subcutaneously injected. Seventeen cases of asthma were reported to have followed courses of bacterial vaccines, administered to patients who previously were not known to have suffered from asthma.

The verdict of these 1500 jurors selected alphabetically and only on the basis of their willingness to serve, indicated that the great expectations of 1906 to 1912 for the general usefulness of vaccines, had not been fulfilled, as shown by the fact that in all but 5 of 63 different disease conditions for which vaccines had been recommended, the percentage of physicians not using or no longer using them was nearer 100 than 90 per cent.

The span of the rise and fall of the cycle of vaccine popularity was about 15 years. About the time when vaccine therapy in general had passed the peak of its popularity attention was directed anew to some of the reactions which occur in the animal body following the parenteral introduction of foreign protein whether of bacterial or other origin. While non-specific protein therapy has come into prominence in the past 10 years it has been used in some form or other for many decades. In the same number of the *Deutsche Medicinische Wochenschrift* in which in 1893 Fränkel reported on the specific treatment of typhoid fever with subcutaneous injections of typhoid vaccine, Rumpf described the treatment of typhoid fever with pyocyaneus vaccine, on the theory that such non-specific injections could activate dormant and possibly specific powers of resistance. A partial list of measures and substances used to influence the course of infections in a more or less non-specific manner includes fixa-

tion abscesses, setons, blisters, sera of man, horse, sheep, goat, chickens, etc., antiyeast serum of Deutschmann, egg albumin, milk, proteose and other split protein products, tissue extracts and antolysates, leucocytic extracts, vaccines, bacterial toxins and antolysates, Coley's fluid, etc. Just at present, milk or its products, and typhoid vaccine seem to be most popular.

### THE REACTION

Following the intravenous injection of a foreign protein, there occurs rise in temperature and pulse rate, chill, sweating, decrease and later increase in circulating leucocytes. The intramuscular injection of proteins, such as milk, is followed by slight rise in temperature and leucocytosis. Reactions following milk injections have been credited to the bacterial content of the milk, by several investigators.

In patients who had fever previous to the injection, as in typhoid fever or pneumonia, the temperature may fall subsequent to the reaction, and in rare instances may not recur. After the reaction there may be noted decrease of pain and swelling in joints in arthritis, or other clinical changes interpreted as an amelioration of the illness for which the injection was given.

Various theories have been advanced to explain the mechanism of the reaction such as the mobilization of ferments (Jobling and Petersen), the increase in resistance associated with leucocytosis or the stimulation of antibody production by previously sensitized cells. In animals previously stimulated to antibody formation, the injection of non-specific protein sometimes causes a reappearance or increase in specific antibodies such as precipitins (Obermayer and Pick, Hektoen). While there is evidence in support of each of these theories, a complete explanation of the effects of the reaction has not been furnished by the laboratory. Stanley Davidson,\* studying the effects of

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\*Davidson, S., *Tr. Medico-Chir. Soc.*, Edinburgh, 1926-27, p. 21.

intravenous injections of nuclein which produce reactions resembling protein reactions, in rabbits obtained leucopenia followed by leucocytosis, but could demonstrate no therapeutic value as judged by protection tests, using anti-pneumococcus serum, or by antibody production using agglutination of *B. typhosus*. Other mechanisms suggested to explain observed effects of the injections include the production of vasodilation, and in the case of ulcer of the stomach, of the inhibition of peristalsis.

### THE CLINICAL USE OF PROTEIN

Even a brief survey of the literature of non-specific protein therapy will reveal an amazing list of different diseases and conditions in which this method has been used and more or less enthusiastically recommended. Included in the list are acute and chronic arthritis, pneumonia, typhoid fever, sepsis, erysipelas, gonorrheal infections, peptic ulcer, bacillary dysentery, encephalitis, general paresis, dermatological conditions, diseases of the eye especially iritis, thrombo-angiitis obliterans, arteriosclerotic gangrene, Raynaud's disease, and nephritis. The length of the list does not make a favorable impression on a follower of Ehrlich. It is reminiscent of the still longer lists of commercial vaccine makers of some years ago and suggests that the clinician is already feeling the lack of laboratory control and guidance which, when available, is so steady and helpful. The list also suggests a departure from the original theory of non-specific stimulation of resistance to infection as defined by Rumpf in the treatment of typhoid, to include conceptions not strictly immunological, but rather physiological, such as vasodilation, and the inhibition of peristalsis. To accept this evidence en masse without submitting each element to a critical survey in relation to other known facts in immunology, physiology, or clinical medicine would be as unscientific and unfruitful as to deny the occurrence, in certain cases, of the subsidence of fever, the reduction of edema in acute arthritis, or the clinical improvement in

paralytic dementia which sometimes follow the use of foreign proteins.

In some instances of reported therapeutic results, clinical claims have been advanced far beyond laboratory and controlled experimental evidence, and here clinical evidence must stand or fall on its own merits. The empiric method has many triumphs to its credit, but for one triumph there have been countless defeats. Safety, as well as progress, demand that clinical observations be controlled as completely as are laboratory experiments. The fact that the attainment of satisfactory controls in clinical medicine is always difficult and sometimes impossible, does not relieve the observer from his obligation to scientific accuracy.

### HURRIED PUBLICATION

Before passing to a more detailed consideration of the evidence submitted in the literature, one or two general comments may be made. The literature on the use of foreign protein in shock therapy as listed in the Cumulative Index increased from four articles in 1916 to 63, the high point, in 1922, with a gradual decrease to 20 in 1928. The curve resembles that of vaccine literature which began 10 years earlier. Some of these articles are carefully written; others seem hurried and not well thought out, and are admittedly "preliminary reports" in which the writer is cautious in his opening paragraph, braver as he marshals his evidence, and absolutely convinced in his conclusion. May I quote two consecutive sentences which I have paraphrased slightly from an article on non-specific protein therapy—"We recognize that because of the small number of cases (some forty dealing with five diseases) and the short interval since treatment, no definite conclusion can be drawn from results obtained. Our purpose in reporting this series of cases is to point out the usefulness, ease of administration, and applicability of non-specific therapy in several types of disease." In view of the situation described in the first sentence it

is difficult to see how the purpose avowed in the second sentence could be attained except perhaps in the demonstration of the "ease of administration."

Other articles give the impression that if they had been laid away six months they might not have been published, or the conclusions might have been modified.

### CLINICAL OBSERVATIONS

That the intravenous injection of foreign protein produces profound changes in the body is shown both by laboratory tests and by clinical observation. The question we have to answer is not whether such changes occur, but whether they are of advantage to the patient and if so whether the advantage gained offsets any possible disadvantages. We have also to determine whether such improvement as is noted is actually due to the remedy, or whether in the disease in question, similar improvement may occur spontaneously.

Last week a young man was admitted to my hospital service seriously ill with a severe lymphangitis of the arm, which was greatly swollen from wrist to shoulder. He had been sick for two days and on admission his fever was  $103^{\circ}$  F. The next morning he was much improved, his temperature was lower, and on the third day of treatment the swelling had entirely subsided and the temperature was normal. The treatment consisted of hot moist dressings only, but had vaccines or foreign protein injections or antisera been used, his case would have appeared near the top of the list of brilliant and convincing results.

There are numerous instances in clinical medicine of the favorable effect as to the patient, of one infection on another disease, as illustrated by the decrease in size or even disappearance of malignant lymphoma following an attack of erysipelas. There is much in common between such an event and the result of injection of foreign protein.

## FAVORABLE RESULTS

The cutaneous lesions of syphilis are reported to have been favorably influenced by parenteral treatment by milk and by typhoid vaccine, and in some instances complete involution of chronic lesions has been brought about. In some cases of syphilis, Wassermann-fast under arsphenamine treatment, the use of foreign protein injections is reported to have been followed by negative Wassermann reactions subsequent to further arsphenamine treatment. These results have been interpreted as evidence of non-specific stimulation of latent forces of resistance in the body.

In general paralysis of the insane the favorable course with long remissions, following the production of chills by malarial infection or by intravenous injections of typhoid vaccine, are well known and seem to indicate that this method of treatment is useful. By some the fever and by others non-specific stimulation have been credited with the good effects of the treatment. Hanschell\* records an interesting case of granuloma pudendi in which the ulceration steadily extended from the genitals over the pubes in spite of various therapeutic measures including antimony potassium tartrate injections. Intravenous injections of typhoid vaccine, producing shock reactions were now combined with further antimony injections in five per cent glucose solution and healing followed. A similar result has been reported by Ormsby in malignant syphilis of the face.

Large spored ringworm infections are reported to have been successfully treated by intravenous injection of typhoid vaccine\*.

In certain inflammations of the eye, especially in iritis, improvement sometimes remarkable in its suddenness,

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\*Hanschell, H. M., *Transactions Royal Society of Tropical Medicine*, XXII, p. 891, 1929.

\*Engman, M. F., *Arch. Dermatology and Syphilology*, XIII, p. 352, 1926.

with reduction of congestion and pain have been observed following foreign protein injections. It is of interest to note that occasionally similar sudden improvement has been seen on the removal of peridental abscesses or after tonsillectomy in iritis. The similarity suggests that the reaction excited by the operation in the surrounding tissues with possible temporary bacteremia is in effect analogous to that following foreign protein.

In arthritis, especially acute arthritis and acute exacerbations of some forms of chronic arthritis, clinical improvement with reduction of pain and swelling are reported after foreign protein therapy.

These few examples will serve to indicate that clinical effects often apparently favorable to the patient, follow foreign protein injections.

### DANGERS

Protein shock therapy is, however, not without its dangers, although it is but fair to say that considering the large numbers of patients treated in this manner, the incidence of fatal accident, at least of those reported, is relatively small. Some years ago I reported three cases\* of fatal outcome, including one case of gonococcal arthritis and one of typhoid fever. While I did not see the patients, I had access to the histories and to the postmortem reports. Punctate cerebral hemorrhages in one, and thrombosis, including thrombosis of the renal artery in another were found. Hench, of Rochester, has recently reported several fatal results in patients under treatment for arthritis. Arterial thrombosis was found in some.

While even the more severe reactions following intravenous injections of foreign proteins usually pass without sequelæ, it sometimes happens that a new and more inconvenient condition is substituted for the original disability, as in the instance cited by Russell of Edinburgh:

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\*Irons, E. E., *Trans. Assoc. Amer. Physicians*, 1917, p. 91.

"It may perhaps interest you if I tell you of a lady who was subject to attacks of bronchitic asthma from time to time. Years ago she was given what I presume was really protein shock. Some of you may remember that at one time the injection of horse serum was used as a remedy for asthma and in the locality where this lady lived several people had been benefited by the injection of what I take to have been horse serum. The lady submitted to this treatment, with the result that she nearly died of protein shock, and further it had this interesting effect upon her, that ever afterward the smell of a horse gave her asthma. Before that time she had ridden a great deal and was quite a skillful horsewoman."

### MODIFIED VIEWS OF SPECIFICITY

Just how the effects which follow foreign protein injections are produced we do not know. One or several factors including mobilization of ferments, stimulation of antibodies and leucocytes, or the inauguration of chemical changes in the amorphous or intercellular tissues and fluids, which affect favorably the lesion in the patient, may be responsible. Observations in this field as well as in the field of what we had supposed to be strictly specific therapy indicate that we must take a somewhat broader view of immunologic reactions than has heretofore been required.

We are impelled toward this more liberal view by the newer conceptions of the mechanism of action of therapeutic agents which until recently have been regarded as perfect examples of the principle of strict specificity and were in some cases developed by reason of such theory. Investigations indicate for example that the actions of quinine in malaria, of emetin in infestation with *Amœba histolytica*, and even of arsphenamine and mercury in syphilis, are probably not as was formerly thought, dependent on the direct effect of the remedy on the invading organism, but indirect through the interaction of other substances in the body of the host.



But with this partial casting off of the steadying cable of specificity, we can not safely put to sea without the compass of clinical controls. This compass of clinical control and the natural history of disease is often very difficult to read, but the absence of other guides demands that we study it with greater rather than less care.

The increasing divergence of clinical opinion as to the ultimate effects of treatment, as the number of factors of etiology increases, is well illustrated in arthritis and requires a careful consideration of the natural history of disease.

### THE NATURAL HISTORY OF DISEASE

Preliminary to drawing conclusions as to the effectiveness of a remedy, it is obviously necessary to know what is likely to be the course of the disease in untreated cases. If we consider a hypothetical disease in which the outcome is known to be uniformly fatal and by a new method of treatment obtain even one or two recoveries in proved cases, we may at once reasonably conclude that the remedy has value.

If we treat a disease whose case fatality is known from years of clinical observation to be 50 per cent, and in a controlled series of cases of sufficient number, obtain by the treatment a case fatality of 25 per cent, we again may conclude that the remedy has clinical value.

The number of observations here necessary to safe conclusions will be much larger, and to satisfy the mathematically minded will probably equal the number of controls which would be required approximately to establish the previously known case fatality rate. Antimeningococcic serum in epidemic cerebrospinal meningitis might be thought of as falling in this category.

As the difference between results in treated and untreated cases grows less, i. e. the effectiveness of the remedy in modifying the outcome less marked, the formulation of

clinical opinion becomes more difficult, the required number of observations and controls greatly increased, and comparison by statistical methods more complicated.

Then, too, the case fatality in age groups, and in epidemics in different years and different localities varies greatly. Diphtheria and scarlet fever are examples. The effectiveness of a remedy is also dependent on the day of the disease when treatment is begun, as is well shown in the treatment of diphtheria by antidiphtheric serum.

Thus in studying statistically the effects of treatment of a disease with reference to case fatality only, in which but two outcomes, recovery or death, are considered, it is at once necessary to subdivide the cases into groups corresponding to those observed in the untreated disease, and a statistical study which at first seemed simple becomes increasingly complex as the number of factors such as age, time of treatment, or epidemic severity increases.

If now we turn to a disease such as arthritis in which there are substituted for the clear cut alternatives of survival or death, such outcomes as relative decrease in disability, relief, complete or relative, of pain, decreased swelling and tenderness, the difficulties of the physician in forming a clinical judgment are increased by the substitution of relative for absolute values, and by the new element of subjective symptoms of the patient whose statements of what he feels and can do are greatly influenced by his state of mind, whether that of hope or discouragement.

The natural history of arthritis presents still further obstacles in the way of clinical judgment. Acute arthritis, due to acute or chronic localized infections elsewhere in the body, frequently heals spontaneously. The swelling, pain and disability disappear and in a few days the joint may function as well as before. In some cases, treatment with foreign protein is said to hasten the return to normal, but whether so treated or not there may be recurrences of the arthritis in the same or other joints. The

clinical question here is whether the benefit of hastened cure, by a few days in some instances, is offset by the failures and possible attendant dangers of the treatment in the others.

The evaluation of the results in relief of pain, disability and deformity which usually pass under the clinical term chronic arthritis is still more troublesome. There may be present the element of infection, but often the immediate cause of disability is mechanical as in osteoarthritis, or in the damage to cartilage of atrophic arthritis, or in referred pain from nerve irritation or pressure.

A man with quiescent and symptomless osteoarthritis of the spine may experience pain following an unusually forceful swing of a golf club. The pain and disability are acute, the underlying cause chronic, and the immediate cause mechanical. He will recover in a few days no matter what is done, provided the treatment does not make him worse.

Examples might be multiplied indefinitely of varying combinations of causes leading to pain, disability or deformity, in a group of patients likely to be gathered together in a clinical report of the results of treatment of arthritis. It must be evident that to draw safe conclusions as to the value of treatment whether by foreign protein or other methods would require more critical judgment than is usually employed or evident in current clinical reports. Failure to group cases by the use of such imperfect standards as are available, or to submit even approximately comparable control groups, often invalidates such meagre conclusions as otherwise might be justified.

Early reports of treatment of disease by any new method are likely to be over-enthusiastic because pioneering requires enthusiasm and further, because the investigator often is entering a new field, inspired by a theory and lacks any considerable background of knowledge of the clinical course of the disease when untreated or treated by other methods.

Even in the more favorable reports of results of treatment of arthritis and iritis there is now and then a note of caution. One of the foremost proponents of protein shock therapy in arthritis finds "that if no benefit is derived after two or three injections it is not probable that further treatment will be beneficial." This would indicate either that the method works only part of the time, or that it is useful only in a selected group of cases. If the latter, then the treatment should be limited to this group, if it can be defined, and a like group of controls furnished.

In discussing the effects of protein therapy in iritis, Benedict and Rucker\* remark: "Protein therapy is used with good results in some diseases of the eye. The indications for use and choice of the substance to be used are not clearly established." "In general, little improvement was noted in cases in which the disease had been active for several months or in which there had been previous attacks. The best results were obtained in the patients seen early in the first attack." Again there is noted a group of favorable cases in which from the natural history of the disease improvement would be most likely to be expected.

Less favorable opinion was expressed by Professor Russell commenting in Edinburgh on Davidson's paper, "For myself personally as a physician, I am so greatly impressed with the subtlety of the chemical changes and the chemical variations that occur in individual human bodies that I am almost prepared to believe anything in the way of therapeutic results. I have had a certain amount of experience along these lines and I am not very fond of protein shock in rheumatoid arthritis." "My percentage of benefit and recovery is greater than that recorded by Professor Stockman as obtained from protein shock, and that without protein shock or shock of any kind whatever."

This résumé of some of the evidence for and against the

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\*Benedict and Rucker, *New Orleans Medical and Surgical Journal*, 81, p. 782, 1929.

use of foreign protein in a few of the many conditions in which it has been used is necessarily brief and incomplete. I have tried to present both sides. The mechanism of the effects as yet lacks complete explanation as well as control by the laboratory. In several groups of diseases the evidence of clinical controls sufficient to warrant conclusions as to the effectiveness of the treatment is lacking.

It must also be noted that in several of the diseases in which clinical effects from foreign protein injections are supported by good evidence, the treatment is designed for use in combination with other recognized methods, rather than to displace them. The clinical effects noted after foreign protein injections in general paralysis of the insane and in other manifestations of syphilis would hardly lead to the treatment of all syphilis by this method to the exclusion of mercury and arsphenamine.

In view of the known relation of chronic infections to iritis, the striking clearing of the circumcorneal inflammation following a foreign protein injection would hardly warrant dependence on this method alone, disregarding other well known methods of examination which may disclose the cause and by its removal prevent recurrence.

In the patient with chronic arthritis there are usually more than one and often several factors contributing to his pain, deformity and disability. The chronic feature of the arthritis may be due to the recurrence of acute exacerbations. Such cases are often associated with chronic local infections, and constitute the group of chronic arthritis which affords examples of relief by the eradication of infection.

The arthritis may be of the atrophic type with swelling and later loss of cartilage and atrophy of muscles, or of the hypertrophic type with proliferation of joint margins and but little muscular atrophy. While infection is believed by some to be one of the chief factors responsible for the former of these two, in both groups other factors including heredity, poor nutrition, metabolic disturbances,

impaired local blood supply, trauma resulting from hard work and from increased weight bearing, to mention but a few, play a large part in the production and progress of joint disease and disability. Pain may result from mechanical causes as in hypertrophic or osteoarthritis and may subside spontaneously.

The permanent relief of pain and disability in chronic arthritis whose etiology is varied and whose course is characterized by spontaneous remissions and exacerbations at intervals of months, seems unlikely to result from the use of one remedy such as foreign protein injections or vaccines, and when improvement occurs following treatment, it seems necessary to reserve some credit for other possible factors.

The evident difficulties of supplying a comparable control series, does not justify clinical conclusions drawn from uncontrolled observations.

In still other disease groups treated by vaccines or milk injections, one function of the treatment seems to be that of a sort of "occupational therapy" in which patient and physician participate, whiling away the time until the natural forces of healing bring about recovery.

### SUMMARY

Striking results including numerous instances of clinical improvement have been noted following the use of protein shock therapy. For the most part these have been seen in acute conditions rather than in those of long duration. As a routine and sole method of treatment the case for protein therapy has not been proved. It is necessary here to distinguish from this large group, methods of specific immunization and desensitization employed to relieve the symptoms of sensitiveness to specific known proteins such as those of some pollens and foods. Whenever it is proposed to use protein shock therapy, in a special case, due consideration should be given to possible serious and unexpected outcomes. The present wave of popularity of

injections of foreign proteins for diseases of all descriptions is likely soon to pass, as have other modes and styles.

Even though we as a jury may fail to reach an agreed verdict as to the value of foreign proteins on each count and disease, we shall, I believe, agree that the evaluation of clinical evidence requires caution, and shall continue the care and study of patients with honesty of purpose and with due regard to the natural history of disease.

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# FACTORS FAVORING THE ONSET AND CONTINUATION OF RHEUMATIC FEVER\*

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During the past three decades our ideas concerning rheumatic fever have undergone striking evolution, as evidenced by the change in nomenclature from acute articular rheumatism to acute rheumatic fever, and finally to rheumatic fever. True it is that the older terms still hold, and rightly so when used to describe particular forms of the infection; but too often one is employed synonymously with another. It is unfortunate that with increasing knowledge of the condition there cannot be devised a new term sufficiently extensive to embrace all of its manifestations, yet distinctive enough to separate it as a nosological entity. The introduction of the terms "infectious rheumatism" (1) and "rheumatic granulomatosis" (2) are attempts in this direction; but having only pathologic or bacteriologic significance they offer little if any advantage over the term rheumatic fever, which at least has background in clinical experience.

Objections to the use of this term are twofold: (i) The adjective "rheumatic" to most persons signifies arthritis or muscular pain; and (ii) some of the manifestations of activity—notably chorea—are frequently not accompanied by fever. To this one may reply, first, that the original meaning of the term "rheuma" was a morbid process flowing from one organ or tissue to another; hence it still retains its descriptive value; and, second, that regular consistent use of the thermometer would reveal some degree of

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\*From the Hospital of the Rockefeller Institute for Medical Research  
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pyrexia during certain periods of most attacks; therefore, fever still remains one of our most valuable guides of persisting infection.

Another point deserves attention; if the term rheumatic fever is substituted merely for the expression, acute articular rheumatism, our nomenclature has suffered a loss, because the second signifies acutely swollen joints. When, on the other hand, it is used to include all of the manifestations of the infection in the same manner as tuberculosis includes all types of the disease induced by the tubercle bacillus, then does it have distinct descriptive value.

To many it seems well to delete the word "acute" because in the majority of cases the infection is long standing. Only when rapidly fatal, or in those cases with a monocyclic course may the adjective acute be properly applied, but even then we must be certain that the infection has become permanently inactive. For example, we do not picture syphilis as acute even though the roseola disappears within two weeks; likewise it may be better not to use any single manifestation of rheumatic fever as an index of chronicity.

Historically the conception of rheumatic fever began with rheumatic polyarthritis; a century has elapsed since the recognition of the importance of involvement of the valvular endocardium; fifty years ago the nature of the subcutaneous nodule was noted; twenty-five years later its analogue in the submiliary myocardial nodule—the Aschoff body—was described; and within the past decade the extent of the vascular lesions has been appreciated. In the meantime, with an improvement in the general economic state of society, together with extensive use of salicylates the clinical picture has apparently changed. Hyperpyrexia rheumatica has become a medical curiosity, and according to old clinicians rheumatic polyarthritis is less severe. But whether there has been a corresponding amelioration in carditis and chorea one may well doubt. Knowledge gained from contemporary graphic methods of recording

cardiac abnormalities renders difficult comparison with statistics obtained in other ways; but figures such as presented by Ehrström and Wahlberg (3) in Helsingfors indicate that there has been no diminution in the incidence of chronic rheumatic heart disease from the administration of salicylates, and according to recent statistics it still seems that rheumatic fever is the largest single factor in the causation of heart disease (4).

May it not then be of greater value to apply another method of historical approach, beginning in childhood and following the various manners of the unfolding of the infection, rather than to orient ourselves from the disease in adults where it is less frequent even though more acute, and where severe cardiac damage is relatively less common.

But before tracing the clinical course it may be well to reconstruct a background of histopathological tissue changes. What does the microscope show us concerning the nature of the infection? Aschoff's description of the submiliary nodules arising in the loose connective tissue septa in the myocardium furnished a structural archetype to which alterations in other tissues might be compared. The discussion which has centered about this nodule has at times diverted attention away from the fact that other lesions, possibly not quite so regular in their cellular structure, might be just as characteristic. One need only mention the subcutaneous nodule. The important factors to recall are the type of tissues and organs involved, and the manner of evolution of the lesions; one may then attempt to construct from these factors or elements a hypothesis of the nature of the infection.

In the Aschoff body there is a minute central area of broken collagen fibers, surrounded by large cells probably derived from locally stimulated connective tissue. At times there are seen polymorphonuclear cells, lymphocytes and plasma cells; and finally fibroblasts leading eventually to a scar. The subcutaneous nodule shows qualitatively similar tissue injury and cellular response, but with different

quantitative distribution of the component parts; the connective tissue degeneration is often more massive, the groups of large mononuclear cells are more numerous. Frequently a large nodule is apparently formed as a conglomeration of smaller nodules. In places large basophilic mononuclear cells seem to arise from vessel walls. Relatively few polymorphonuclears are present. If now we examine the joints another but related picture appears. The periarticular tendons and ligaments show numerous microscopic areas in the form of nodules or tongues, most having necrotic centers and surrounding proliferated cells. The synovia shows palisading of its lining layer, and minute foci with central necrosis with surrounding collars of cells. Diffuse infiltrations of polymorphonuclears are common. The periarticular tissues are infiltrated with serum which in part contributes to the familiar swollen joint; and there is destruction of muscle fibers at the musculotendinous junctions (2, 5, 6). In other words, the minute focal and vascular lesions about the joints are numerous and exudation is widespread. Involvement of the pleura and pericardium shows similar exudative tendency, but in the substance of these membranes are often foci comparable with the Aschoff bodies. In the auricular endocardium there are similar tissue and cellular changes, but these are arranged in streaks and plaques without interruption in the continuity of the lining endothelium (7, 8a). In the valves on first sight appears another picture, for the endocardium is broken and thrombotic verrucae are often, though not always, laid down at the site of impact of the leaflets. But throughout the substance of the valve and in the chordae may often be seen broken collagen material, proliferative cells and infiltrations like that of the auricular endocardium; at times they are arranged in typical Aschoff bodies. As so beautifully shown by Von Glahn and Pappenheimer (9) and others, many portions of the vascular system are similarly involved. In the aorta focal lesions follow branches of the vasa vasorum; but smaller arteries have areas of end- and mesarteritis, always accompanied by focal destruction of connective or elastic tissue. In the

peritonsillar, nasopharyngeal and intestinal blood vessels Holsti (10) has demonstrated extensive endarteritis verucosa. In the peritonsillar capsule near the points of attachment of the pharyngeal muscles MacLachlan and Richey (11), Gräff (12) and others have described areas very similar to Aschoff bodies, and also in the tongue about the lingual tonsils. Gräff applies the term "primary complex" to these peritonsillar lesions because of their hypothetical rôle as sites whence the infectious agent is distributed to other parts of the body. He thinks that the pathological condition of the blood vessels supplying these lesions favors such a distribution.

The striking picture of the Aschoff body cells has, moreover, attracted attention away from what appears to be the initial injury to the connective tissue fibers. Von Glahn and Pappenheimer have frequently described the granular broken appearance of these fibers, and many have seen the fibrin-like staining infiltration in the foci; but recently Klinge (13) claims that the primary change is a minute focal "fibrinoid swelling" of the intercellular mesenchymal ground substance; which swelling leads secondarily to a fraying out and altered staining reaction of the collagen fibers and fragmentation of the elastica. He also describes waxy degenerations of individual muscle fibers with secondary proliferation of the perimysium.

It thus appears that rheumatic fever instead of affecting any one set of organs is a disease primarily of the connective tissue, or, in Hueck's (14) words, of the mesenchymal system. Those structures composed chiefly of connective tissue, and specially subject to functional stress and strain and undergoing active motion appear to be the most vulnerable. Interference with the function of these moving structures may, however, detract attention from unobtrusive lesions in other organs, such as recently described by Paul (15) in a rheumatic perihepatitis with characteristic lesions in the underlying blood vessels. Rheumatic vasculitis in the kidneys has been described by Fahr (16), Evans (17) and others; and symptoms of appendicitis, in-

timately associated with generalized rheumatic fever, point to a similar involvement of at least one portion of the intestinal tract. A constantly growing literature on pulmonary lesions in this disease indicates also how the lower as well as the upper portion of the respiratory tract may be involved.

A knowledge of the numerous points and tissues where the infectious agent attacks the body gives us another standard with which to judge rheumatic fever. If so many organs or tissues are simultaneously involved, there is every reason to suppose that they may also be individually and successively implicated. In fact, pediatricians have long appreciated the tendency of children to show first one and then another of the so-called rheumatic series (18); and that not until after the lapse of years might enough members of this series have appeared to render certain a diagnosis. Monosymptomatic signs of disease are difficult of interpretation unless sufficiently characteristic to have diagnostic specificity; for example, the various cutaneous syphilides. But in order to form correct judgment concerning visceral lesions it is often necessary to have concomitant clinical signs or specific laboratory aids.

Unfortunately in the case of rheumatic fever no specific laboratory test is at hand; some of the concomitant, easily visible manifestations, such as tonsillitis, are too non-specific to furnish much needed assistance. But in these very non-specific signs we may possess most important aids to understanding the nature of the infection; and in tracing the life history of rheumatic fever it is essential to note their occurrence and then try to interpret their influence upon the course of the malady.

The causation of many chronic diseases is usually the algebraic sum of a number of factors rather than the exclusive action of any one. Infection is the result of interaction between an animal host and an infecting parasite in which many variables are too subtle for laboratory measurement. Moreover, the study of the life history of

chronic disease in the patient gives us many useful hints as to the nature of the illness, and often furnishes therapeutic indications. For example, we now know that the presence of tubercle bacilli in a body does not necessarily indicate active tuberculosis. Certain environmental conditions favor the spread of the lesions, others favor their regression. Indeed, a study of these latter conditions has furnished us with some of our most important weapons against this disease; and comparable knowledge may conceivably have a similar effect in rheumatic fever.

Geographically the disease seems to be essentially one of the temperate zone. Clarke (19) has recently marshalled most convincing evidence indicating that in the true tropics it is 15 to 20 times less frequent than in Europe. Studies by the Seegals (20) indicate, moreover, that the infection is less common in the southern part of this country; and observations (21) from New Orleans show that when present in the South it runs a milder course than in the North. The ultimate effect of removing rheumatic subjects to hot or dry climates is, however, still a matter for investigation.

Statistics also show that obvious rheumatic fever is from fifteen to twenty times more frequent among the laboring classes than in those forming the bulk of private practice. But many physicians can testify concerning its existence and tendency to progress in patients living under apparently ideal home surroundings. Another viewpoint has been advanced to the effect that among persons in better economic conditions the infection may have relatively more monosymptomatic forms and hence lead more frequently to cardiac damage without obvious general symptoms.

Infants and very young children are relatively free from the disease, and, even though cases appear in children of from two to four years, the curve of frequency of first attacks does not begin its steep ascent until about the age of five or six years. It then rises steadily until the period from

nine to eleven years when it begins to fall; first attacks are relatively much more rare in adults than in children. The studies of Wilson, Lingg, and Croxford (22) indicate, moreover, that children suffering from the infection tend to have fewer obvious relapses after the age of eleven or twelve years. Thus a condition of resistance seems to begin to develop about the age of puberty. But the period of greatest incidence of new cases during the first few years of school life is worthy of emphasis. Is it the result of intimate contact like that seen in measles, or is it due to an age-linked hypersensitiveness? The experience of many observers teaches that the infection is progressing steadily in the hearts of many children while avoiding other organs. For example, Sutton (23) found in the Bellevue Hospital 18 per cent of 427 rheumatic children to have well developed rheumatic carditis without a previous history of either polyarthritis or chorea.

An apparent precursory factor in a majority of cases is repeated infection in the respiratory tract, often in the form of tonsillitis, sinusitis, middle ear disease, or bronchitis. In our experience so frequent has been the occurrence of acute tonsillitis within from one to five weeks of an acute attack that we now date the duration of a given attack from the onset of tonsillitis. But more detailed investigation of the previous state of health of patients usually reveals an earlier history of repeated sore throats, otitis media, or of recurring or almost continuous sinusitis. Not infrequently closer questioning discloses mild joint or growing pains with these upper respiratory infections. Coates and Thomas (24), Coates and Coombs (25), and Yining (26), all report the finding of small subcutaneous granules in a fairly high percentage of school children. Whether or not these are genuine rheumatic subcutaneous nodules is a moot point; but their alleged demonstration by serious students of the disease should stimulate renewed investigation, because extensive painless nodules have been frequently observed in children having no other symptoms of sufficient severity to incapacitate them.

Other conditions in many children preliminary to an acute attack are loss of weight, anorexia, and general signs of mild intoxication. To these Vining has applied the term "toxic debility," and found that many of his rheumatic youngsters had in addition a history of intestinal disturbance of sufficient severity to point to the intestinal tract as an area whence the infectious agent might be spread throughout the body. The greater liability of children of the poorer classes to suffer disorders of malnutrition or to be deprived of certain accessory food substances suggests that possibly these are elements leading to a higher incidence of the disease among such individuals compared with people living on a higher economic scale. Recent studies of rheumatic children in out-patient departments furnish additional support concerning the influence of nutrition in that loss of weight has been found to be one of the most common precursors of a relapse.

Recurrences of symptoms sufficiently severe to be called true relapses are commonly observed in children year after year; but symptoms and signs too mild to attract much attention not infrequently occur between relapses. For example, Shapiro (27) has recently noted electrocardiographic evidence of active cardiac damage in at least 60 per cent of 119 school children following apparently complete recovery from an acute attack; and Levy and Turner (28) have recorded electrocardiographic abnormalities weeks and months before the onset of acute symptoms. Persistent lowgrade leucocytosis, unexplained on grounds other than that of persisting rheumatic infection, is not infrequent. Several of our patients have observed recurring erythema marginatum for months without appreciating its significance until more incapacitating manifestations forced them to seek hospital care, and the continuance of this peculiar rash for weeks or months following subsidence of acute arthritis not infrequently is an index of continuing infection.

Not only are such pictures seen in children, in whom we have learned to expect repeated relapses, but a similar history is not rare in adults, when sought with sufficient care.



For example, a man, aged 33 years, in good circumstances gave a history of acute tonsillitis in 1929 followed by acute rheumatic polyarthrititis; then by tonsillectomy. In the winter of 1930 he had sore throat followed by a similar polyarthrititis. But more careful questioning revealed repeated pharyngitis for eight to ten years previously, several attacks of sinusitis and recurring pain in the neck and back of sufficient severity to make movements difficult. It does not appear unreasonable to suppose that during the previous years he was suffering from mild rheumatic infection which was not brought to acute intensity until his first attack of severe tonsillitis. Such histories are not rare.

That tonsillitis plays an important rôle in precipitating many acute attacks of rheumatic fever we can accept as fairly well established. Where both diseases are reportable, the peak of the curve of the former antedates that of the latter by about two weeks. Glover (29), in presenting details concerning several concomitant epidemics of these two conditions, advances the theory that they are spread by droplet infection which must reach a certain intensity before the resulting diseases reach epidemic proportions. In one outbreak carefully studied, the carrier rate for meningococci and the incidence of cerebrospinal meningitis and of rheumatic fever, ran parallel; and this suggests that similar influences were at play in causing an increase in all three conditions. With a diminution in crowding there was a disappearance of both diseases, and with renewed crowding there was a return of an equal number of each. While these appeared to be primary attacks of rheumatic fever, one would like information concerning the previous history of the rheumatic individuals. Such questions are raised by the study of epidemics among children with rheumatic heart disease or convalescent from rheumatic fever, such as reported by Boas and Schwartz (30), and Hiller and Graef (31). In the first epidemic reported by the former group there were four cases of bronchopneumonia accompanied by rheumatic carditis, and one of acute

tonsillitis; in the second, although the precursory respiratory infection was not so marked, still acute rheumatic exacerbations developed in six boys in rapid succession. Among 19 non-rheumatic children in the same wards, none suffered from rheumatic fever, while in 22 previously rheumatic subjects 11 developed acute rheumatic fever. In the epidemic reported by Hiller and Graef there were 43 children exposed, of whom 39 probably were previously rheumatic. Within five days of arrival at the camp there were 12 cases of upper respiratory infection, and within five weeks 10 cases of polyarthritis, one of chorea, two of bronchopneumonia, one of acute bronchitis, and one of tonsillitis, pericarditis and pneumonia. Unfortunately the exact relationship of the upper respiratory infections to polyarthritis in each case was not recorded; nevertheless the high incidence of acute exacerbations of the disease in previously rheumatic children is worthy of emphasis, as is also the occurrence of severe pulmonary infection.

Scarlet fever is another disease intimately associated both with first attacks and with relapses of rheumatic fever. Some clinicians state that this disease in previously rheumatic children is practically always followed by acute manifestations of rheumatic fever. This suggests the possibility of comparable influences in all of the above mentioned epidemics, namely upper respiratory infection.

I realize fully the possibility of at least two interpretations of the phenomena described: (i) That rheumatic fever may be due to an unknown virus which may long lie latent in the body, and be incited to renewed activity because of the depressing influence of the acute respiratory infection. (ii) On the other hand, it is possible that repeated and persisting low-grade infections induce or are accompanied by tissue changes too mild to be dignified by the name rheumatic fever, and that only with a stormy acute infection such as tonsillitis, or with invasion of the pulmonary tract by streptococci are the accompanying morbid processes raised above the clinical horizon. In

either case the conditions existing prior to the attack of acute rheumatic fever are worthy of more detailed study than they usually receive.

To illustrate this point let us consider another group in which a contagious element may exist: the family. Since St. Lawrence's (32) report eight years ago showing the incidence of multiple cases of rheumatic fever in a group of families to be as high as that of tuberculosis, there have been several confirmatory studies. It now appears that in a rheumatic family with one case the probability of occurrence of a second case is three or four times as great as in a family previously free from the disease. Although the various factors favoring the development of rheumatic fever may be almost as difficult of analysis within a family as in any other group, the family as a unit offers a promising field for investigation. For example, several years ago we learned that the mother of one of our rheumatic children frequently had sore throats within a short time of the appearance of relapses in the child. Following the removal of badly diseased tonsils in the mother her attacks of sore throat ceased and since then the child has been free from recurrences. Last winter a boy was admitted to the hospital with the following recent history of acute infections in himself, his mother and sister:

- 1st day Onset of "grippe" in patient and sister.
- 5th day Patient better; sister developed rash.
- 8th day Mother developed "grippe" with severe pain in back; sister recovered and lost rash.
- 12th day Mother recovered.
- 14th day Patient developed fever and beginning polyarthritis.
- 16th day Patient had evidence of severe myocarditis.
- 19th day Patient had signs of pericarditis.

Such a history of contagion reminds one of the concomitant respiratory infections in the epidemics mentioned above, and suggests the possibility of atypical non-diagnostic manifestations in the sister and mother. Indeed, a correlation of all of the illnesses of the members of fifteen rheumatic families by Paul and Salinger (33) has already yielded important data along these lines. They have shown

that both primary and secondary attacks of rheumatic fever in certain members of a family have been accompanied by the simultaneous appearance of recognizable rheumatic fever in other members of the family, and not infrequently by the appearance of such non-specific affections as sore throat, bronchitis, bronchopneumonia and skin rashes. They found in addition that the disease spread more frequently to the children under twelve years of age than to the older children and adults. Another striking feature among these families was the frequency with which so called non-specific respiratory infections occurred before the appearance of characteristic rheumatic fever. If an extension of this type of investigation yields similar data, we shall be in a position to formulate preventive measures not heretofore applied. Indeed, the information already available from the several reports above reviewed together with those of Andrieu (34), Grenet (35), Irvine-Jones (36) and others suggests strongly the communicable nature of the infection. The time when health authorities will recognize this feature of the disease and attempt to assemble data compiled from compulsory notification may be nearer than we can now foresee. The numerical and economic importance of the problem far outweighs that of poliomyelitis, encephalitis, leprosy, and many other reportable diseases.

One more feature deserves attention; the hypersensitiveness of patients with rheumatic fever to streptococcal products, which has been found by most observers to be higher than in any other disease. One must admit that such hypersensitiveness is found in many non-rheumatic persons; hence these skin tests have not diagnostic specificity. But it has offered a possible explanation of certain peculiarities of the disease (37). Mackenzie and Hanger (38), Kaiser (39), and Ando (40) have all shown this type of hypersensitiveness to be rare or absent in infancy and to increase in relative frequency with each half decade up to the period of adult life. In Duckett Jones' (41) experience over 95 per cent of rheumatic children have positive reac-

tions to a filtrate of a single strain of indifferent streptococci. Derick and Fulton (42) have recently found skin hypersensitivity to hemolytic streptococcal nucleoproteins in 88 per cent of rheumatic children between six and ten years of age compared with only 12 per cent in non-rheumatic children, surely a most significant difference, when it is noted that 88 per cent of their entire group of rheumatic fever patients gave positive reactions. It thus seems that hypersensitiveness to streptococci which appears with advancing years in many individuals occurs much earlier in rheumatic fever patients. Probably the repeated respiratory infections already so frequently mentioned are factors in conditioning a high sensitivity to streptococci; and it does not seem improbable that the condition recognized as acute rheumatic fever is incited by intense, focal infections such as acute tonsillitis, or otitis media—both due to hemolytic streptococci—occurring in already somewhat hypersensitive bodies. On the other hand, it must be recognized that we do not know definitely whether the relationship between streptococcal hypersensitiveness and rheumatic fever is causal or merely concomitant. Its existence, however, gives us a definite point of attack (43), for could we influence it in one direction or another we would have an index with which to judge the effect of certain therapeutic efforts.

### SUMMARY

Rheumatic fever is economically one of the most important diseases, not only because of its acute manifestations, but also because of its rôle in the production of between 30 and 40 per cent of chronic cardiac disease in the latitude of the North Atlantic States. Microscopic findings indicate it to be a wide-spread disease involving by preference mesenchymal structures or mesenchymal portions of parenchymatous organs. Physiological stress and strain appear to favor localization of its manifestations, although it may be locally active without giving rise to symptoms; and various vulnerable organs may be either simultaneously or independently involved.

A number of factors appear to have causative relationships. Climatic conditions such as exist in temperate zones in winter favor its development; while sunny dry summers and tropical weather inhibit or prevent its evolution. Among the poorer classes it is from 15 to 20 times more prevalent than in persons better housed and fed. Malnutrition and mild toxic states are frequent precursors of characteristic attacks. Most patients, both children and adults, give a history of repeated non-specific infections of the respiratory tract, tonsils, sinuses, or middle ear, extending over several years, before a typical attack of rheumatic fever is ushered in by a severe focal infection. Persons in intimate contact with patients during acute outbreaks of rheumatic fever not infrequently suffer simultaneously from upper respiratory infections, or from typical rheumatic fever; hence there seems to be a distinct communicable factor favoring its spread. Because chronicity and relapses are so frequent, and crippling cardiac damage is of such gradual evolution, and finally because laboratory tests often reveal activity in periods between attacks, it seems justifiable to consider the infection to be characterized by long periods of preparation or sensitization of the tissues, the result of repeated mild infection before a more intense focal infection sets off the violent explosion recognized as acute rheumatic fever. Similar mild infections, moreover, apparently favor the continuation of true rheumatic activity in viscera already involved. It seems logical, therefore, to regard these preparatory periods and mild chronic infections between acute outbreaks as essential parts of the morbid process; hence our therapeutic and prophylactic efforts should be directed against them as well as against the more acute manifestations of the disease.

NOTE—While this article was in press the monograph (44) of Coburn appeared which presents much valuable additional evidence concerning the chronic and contiguous nature of rheumatic fever; its geographic distribution; the high degree of cutaneous sensitivity of rheumatic fever

patients to hemolytic streptococcal nucleoprotein; and finally, a striking parallelism between an increase of hemolytic streptococci in the upper respiratory tract and relapses in patients with the disease. He apparently wishes to designate the malady as the "rheumatic state" and only recognizes "rheumatic fever" when it is diagnostically clear cut.

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# THE CONTINUED EDUCATION OF THE DOCTOR\*

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The invitation to address you, which I had the honor to receive from Dr. Marcus, suggested that I might speak along lines similar to those presented to The New York Academy of Medicine in the Presidential Address last January.

In the course of that discussion, it was stated that some of the difficulties of present medical practice might be relieved by a return to an earlier practice when every family had a definite medical adviser who was trained in the field of general medicine with a sufficient knowledge of special fields to know when the condition would be benefited by the care of a specialist. This comment attracted the attention of many physicians and laymen. It is, of course, no new idea. The fact that it was seized upon as the main text of an address dealing with various matters emphasizes still more that it has a great hold upon the imagination.

It will be my endeavor to present the subject in such a way that you will recognize that the family doctor is essential in the continued education of the doctor. I shall confine myself to a consideration of the situation as it exists in and around New York City. But you will recognize that the conditions discussed are not local in their application.

There is little doubt in the mind of any one who is giving thought to matters of health, that the time is opportune and even demands an accurate evaluation of all the factors concerned in establishing and maintaining the health of

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the individual and the community. Paramount among these factors is the one that any solution of medical service to a community is in the last analysis dependent upon the science of medicine and on its efficient practice. Attention to organization, economics, distribution, and all other factors is of value only as it serves greater efficiency in medical practice. It may prove of value to review how The New York Academy of Medicine seeks to serve these ends.

The Academy has three fundamental aims: the maintenance of an inclusive medical library, the advancement of public health interests, and the advancement of medical education. It is the latter of these which particularly concerns us at this time. And it is that phase of medical education which pertains to the doctor after he has received his degree and license to practice his profession which we would especially emphasize. But the Academy itself is in no sense a post-graduate medical institution. We have no faculty; we have no students enrolled in our courses. Nevertheless every activity which the Academy carries on has for its object the continued education of the doctor—the aim to improve the practitioners and their service to the community.

For several years a Committee on Medical Education has been charged with this special field and it has done splendid work in providing lectures and practical demonstrations at the Academy.

This committee is probably known to many of you through the Bureau of Clinical Information and its publications detailing the opportunities for study or demonstration in the various hospitals. All these activities, we have every reason to believe, are of value to the doctor in New York, whether residing there or making a transient visit. But they lack one essential thing: they are not parts of a whole; their relationship oftentimes is not apparent and oftentimes nonexistent. Within the past half-decade the Academy has reached a full realization that, if it is to enjoy its privileges, it should accept its responsibilities.

There was brought to our consciousness the need of a careful study of educational opportunities. From whatever angle the question was approached, one constantly returned to the fundamental point that a great wastage was taking place and that the recent medical graduate was too much at the mercy of chance for his continued education.

Our first approach was to determine the qualifications which would properly entitle a man to be considered as competent in a given field. A subcommittee was asked to attack this phase of the problem of specialism and has spent much time in hard, conscientious work. It has evolved a program for the minimum training and experience which a man should receive before he can be graded as qualified in a specialty. This was not so difficult to do because it was somewhat in the nature of an academic pronouncement. The weakness of the position became apparent, however, when someone raised the question as to how the individual doctor, who desired to become proficient in any particular field, could find the necessary opportunities to meet the academic requirements. A review of the courses given in the various hospitals of the city, which had received the endorsement of the Academy as being of value, showed that few could fully meet the requirements of training men in a really efficient way. This led the committee to the following statement of opinion.

“In order to raise the standard of their own groups certain national organizations are demanding definite educational and practical requirements for admission to membership. This certainly prompts young men to seek the necessary proficiency in order to qualify, but the requirements in themselves do not provide opportunities for study. Such opportunities at present exist only to a limited degree. Only a few universities have established complete departments or separate courses depending on their facilities. Several of them offer an advanced degree for work accomplished. A large number of hospitals, however, especially those devoted to the specialties, have established

residencies of from 1 to 2 years which serve as training for that specialty. These various efforts are very worthy and in their particular locality those institutions are doing commendable work. The opportunities thus offered, however, are inadequate for the total number of men who want to, or who should, take advanced courses.

"It has seemed to our committee that in order to actually help along the cause of medical education, especially in reference to advanced or graduate medical education, it is more important to provide opportunities for study than to make demands on the young medical man. On an undergraduate, we do not simply make demands; we provide the medical school in which systematized courses are offered which make it possible to pursue an orderly, well arranged course of study, and then at the end of four years we demand that he successfully pass in the prescribed subjects. In the same way interns are provided with hospitals in which they continue their studies under the direction of members of the attending staff. For the young man who wants to become a specialist, however, no such definitely arranged, orderly courses are provided. He has to shift for himself and try to pick up whatever knowledge he requires to perfect himself in his chosen field.

"It is time we assume a helpful attitude toward these men. We should provide opportunities for study and practical work, carefully and systematically arranged, and after that has been done we may make certain demands on them.

"With this idea in mind we may ask ourselves, and ask of this city, what we have done to further the cause of graduate education? Have we made the best of our opportunities? If we have not, what steps shall we take to utilize the clinical resources of New York City for the ultimate benefit of the people, not only of New York City but of a large part of this country?"

This extract from their report goes directly to the fundamental point in the discussion. The question being

raised, it immediately becomes our responsibility to attempt to find the correct answer. For this purpose the Board of Advanced Medical Education was set up, consisting of representatives of some 30 hospitals in New York City which had shown themselves sympathetic to the idea of taking part in the formal education of our medical graduates. These representatives have met on several occasions and have individually worked on the problem of providing adequate facilities so that the largest possible number of medical graduates can be guided and aided in their continued education, but with the thought of the specialist always uppermost.

You will recall that the original aim only included formulating qualifications for a specialist and expanded into finding opportunities whereby the doctor who was desirous of becoming a specialist could be provided with them. At this stage it became quite apparent that any plan for the development of specialists which did not take into consideration the development of what was recognized as the general practitioner, was lacking in an approach to the core of the matter. No one who has written upon, discussed, or given real thought to the problem of specialization has failed to emphasize the grave danger that lies ahead of the medical profession if its young graduates are launched into special fields without a broad fundamental training. A training which, in fact, will make of them competent general practitioners, even though of limited experience, able to understand and take care of the major portion of the illnesses of the community efficiently. In spite of this clear understanding, it is quite apparent that the trend is more and more toward early specialization without sufficient basic clinical training. The Academy therefore came face to face with the entire problem of the continued education of the young graduate from the time he receives his license to practice until he is established in his profession, well qualified for general practice and, if he so elect, for specialization.

The magnitude of such an undertaking was immediately recognized. The question at once was raised: Is the time opportune for attacking such a job, and if it is, is there any hope that the Academy of Medicine is in a position to lead in its successful conduct? We have not tried to evade the issue and after careful consideration we are now launched upon an attempt to find the proper formula whereby such a goal may be reached.

During the two years that this situation had been developing, another thought had taken shape in the minds of those who are devoting their interest and time to this general subject. This thought related to the question as to whether within our own organization we could take an immediate forward step. Other committees working on this phase of the project brought forward a plan for a change in our internal organization which has received the approval of the Academy.

Heretofore, newly elected members of the Academy organization, as mentioned above, have been designated as Fellows and have had the privilege of associating themselves with all the activities of the Academy and of taking part in the administration and proceedings of all its Sections. No attempt was made to carry these men forward in their educational development as individuals except as they, themselves, saw fit to develop; and the Academy recognized no change in their status from the time of their admission. Under the new plan, a newly elected individual will become a member of the Academy. Upon his request, he will be assigned as a participator in some one of the Sections. The activities of this Section represent the line of development along which he particularly wishes to travel. He is entirely free to enjoy all the coordinate educational advantages that other activities of the Academy and other Sections may afford. In fact, he will be encouraged to avail himself of them. At such time as any such member demonstrates to a specially selected committee, of the older men of his Section of choice, that he is proficient in his field, as proved by such tests as this

committee sees fit to establish, he will be recommended for *promotion* to Fellowship in that branch and, for example, become a Fellow of the Academy of Medicine in Otology, General Medicine, or General Surgery, etc. Having done this, we are now faced with the necessity of procuring the facilities whereby the young man may carry forward the needed development, for his promotion.

But the membership of the Academy includes less than 2000 of the total 12,000 practitioners of medicine in the metropolitan district. If the individual who has attained the rank of Fellow in any particular field receives, thereby, any advantage, it is only fair that the Academy should extend the opportunities to gain this advantage to members of the profession who are not on the Academy roll. Similar opportunities should be furnished to all young men of the profession, and if they so desire, the Academy should certify these young men, whether or not members, that they have attained that degree of proficiency which, in the opinion of the Academy, entitles them to recognition in a particular field. It may well be that the Academy never will have to render this service; that the doctors not belonging to the Academy will have no concern as to whether it certifies to their qualification or not. The situation is not altered thereby because the responsibility to provide educational opportunities is none the less a real one.

It is evident that the continued education of the doctor can only be approached through a consideration of the needs of the general practitioner. In other words, the latter is of necessity from the standpoint of sound pedagogy, the starting point.

In New York City there is well over a hundred million dollars invested in the education of medical students and the advancement of the medical sciences, incidental thereto. When these same students become doctors of medicine and receive a license from the state, they are entirely dependent upon their own initiative as to further events. After that time neither the university nor the state con-

cerns itself with their development. They are legally endowed with full authority to undertake the care of the sick. No one is concerned as to whether further training or experience qualify them to minister to the pregnant woman, extirpate her uterine, determine the metabolic rate caused by a dysfunctioning thyroid, or trephine the eyeball for glaucoma.

In blunt English, it is no less than foolhardy to neglect the continued education of the doctor at this most critical period of his development when a reasonable amount of effort and the expenditure of a relatively small sum would guide him to a real orientation of his abilities.

While nearly every medical student, upon receiving his degree, takes a hospital internship, some do not and it is a matter of unconcern in the eyes of this state whether they do or not. When they do, however, the education received as an intern is largely a matter of chance. It is well within the truth to say that both the board of trustees and the medical board of many of our hospitals are more concerned with what the intern gives to the hospital than they are with the education he receives from it. If he be a man of unusual attainment and ability to absorb information, his associations as hospital intern are of the utmost educational value, provided the type of work done by the hospital staff is of a high grade. If, on the other hand, he be of average ability, it is quite probable that he will be so overwhelmed with the routine work which is required of him that he will have little energy left to look after his educational interests. A number of interns of more than average ability have acknowledged that they are so rushed and fatigued by carrying out their prescribed duties that they have little incentive to undertake serious study. They, of course, pick up a very considerable amount of practical education but a moment's consideration shows that, under proper arrangement, the time spent in the hospital could be made of much greater value to the intern. It is true that the American Medical Association, the Association of American Medical Colleges, and the American College



of Surgeons, have set up certain standards to which hospitals must conform if they receive accredited standing as suitable institutions for internship, but this represents only a beginning.

It is well within my memory when the leading hospitals of New York City looked askance upon the admission of undergraduate medical students to their wards and demonstration rooms for educational purposes. Thirty years has seen an enormous change in this direction. When once it was pointed out to the trustees of these institutions that they had a definite obligation toward using the facilities of their hospitals for the education of medical students, they welcomed the innovation. Not only did they welcome it but worked hand in hand with the universities. They sought and obtained enormous sums of money for the specific purpose of granting such education. To such an extent has this idea developed at the present time that every board of hospital trustees feels the need of some affiliation with a teaching institution and the more intimate these associations can be made, the better satisfied are the trustees.

If this change of front was accomplished in the period of less than a generation, there is every reason to believe that when the attention of hospital authorities is definitely called to their further obligation toward the educational needs of these same men, the response will be equally satisfactory and effective. The Board of Advanced Medical Education already mentioned, is a first step in inaugurating this program.

Through definite effort and hard work by the American Medical Association, the Association of American Medical Colleges, the stimulation of some of the Foundations, a tremendous step forward has been made, in giving a satisfactory education to the aspirant for the degree of Doctor of Medicine. It is now equally important that forces should be set in motion which will give definite form to granting to this aspirant opportunity and guidance

through the years subsequent to his receiving his doctorate of medicine.

I imagine that if any one of you were casually asked to lay down a program for the satisfactory, continued education of the doctor through the first five years of his entrance into the medical profession, you would feel that a free evening would permit you to satisfactorily answer the proposal. From a rather distressing personal experience and close observation of the experience of others, I am inclined to believe that the result of your quiet evening would be to find yourself in rather a hopeless maze. In other words, it has become obvious to those of us who have put a good deal of thought and effort upon this subject, that the problem is hardly less difficult than that which confronted those who wished to put undergraduate medical education on a sound and more or less systematized basis. This was the work of many able men over a period of years. It is quite probable that the same amount of energy must be expended in meeting the present problem. The first step, obviously, is to demonstrate the need for a careful review of the problems, and subsequently the formulation of plans which may reasonably be expected to lead us to our goal.

It is requisite that a careful evaluation be made of the degree of proficiency to which our graduates arrive, five years after their graduation, and the roads along which they travel during these five years, in order that we may reach an understanding of the relative proficiency of result and efficiency of method. The hospital internship, as already pointed out, needs careful revision as the first step. In some cases the intern has an opportunity to get a fairly broad vision of the field of clinical medicine. He comes in contact with many types of cases, with men of stimulating minds; and he has an opportunity to compare methods of arriving at correct conclusions and obtaining definite results. In other cases, he is placed upon a treadmill where, by violent physical effort, he finally reaches

the top and falls over the other side with a vision that has been cramped within the narrow confines of one field. In saying this I am not referring to the hospitals for special service only, but to those covering more or less broad fields where the intern is confined to a so-called "straight service." In still other institutions the whole system connected with the intern's education is one of wasted opportunities. It is rare that any one makes it his concern to see that the intern gets a fair deal and often no one sees to it that the intern really renders a service that prevents his falling into sloppy, careless methods. He passes out of the hospital door with a diploma bearing the stamp of approval of the hospital authorities; a document in many instances of real value and representing hard endeavor and definite attainment; in other instances valueless. What then? He may, by fortunate association, unusual ability, or pleasing personality, find himself sought after and encouraged, placed in positions where his growth is provided for and where he is stimulated toward his continued education. On the other hand, lacking these fortuitous advantages, he finds himself in a precarious position of unfruitful struggle. Possessed of energy and initiative, those belonging to the latter group with much wasted effort ally themselves with various undertakings, and valiantly push forward by the trial and error method toward better things. During this period the great majority of them of necessity must be chiefly concerned with earning an income. In many instances they are forced to accept associations that are of little educational value and giving little professional experience, in order to meet the expense of existence. This method of competition of course has the advantage of bringing to the top those of real ability and sound fundamental training. Rarely does such a one fail of ultimate attainment, of good education and real proficiency in his profession. From this and the first group many of the leaders come. But what of the rank and file who are endowed with sufficient inherent ability and energy, with proper encouragement to become the back-bone rather than the head of the medical profession? Lacking the qualifi-

cations for leadership, they trail behind and are gradually content to accept what seems the inevitable, and struggle to form a clientele to which they give a service comparable to their narrow opportunities and from which they receive a meager return.

I do not believe I can be challenged when I say that this group falls far short of reaching that degree of proficiency of which they are capable, under proper guidance, stimulation and fair opportunity. Is it asking too much that the head be concerned with the strengthening of the backbone? Should not those who enjoy the privilege of leadership be greatly concerned and lend more than a helping hand toward this object?

This situation is also responsible for a great many of our younger men launching themselves into a special field with very inadequate previous training, because by this simple device they are able more promptly to get financial return and feel a certain relief from economic burden. The public, as matters at present stand, is of necessity poorly informed as to the actual qualifications of many designating themselves as specialists. The tradition, deeply rooted in the human mind, that special service is of special value and must accordingly be paid for at special rates, yields a higher immediate financial reward to these men than to those who endeavor in broader fields. This system, I repeat, is tragically wasteful and unsatisfactory. We, as members of the profession are naturally loath to face the fact squarely that many of our colleagues are, of necessity, lacking in the competency that is obviously desirable. In doing this we are open to the accusation of disloyalty and of tending to inculcate in the public mind a lack of confidence in the profession which we hold in high honor. Some of the results and pronouncements which have been made in connection with the various studies to which I have referred have brought forth this criticism rather severely. I believe that this is begging the question. Until the profession is willing and able to devise a plan and demand the execution of that plan, whereby those of its mem-

bers are encouraged and helped to the utmost to attain their fullest development, and whereby the public may have, through standards set up by the profession itself, access to information which will permit them to know who are the well trained, carefully prepared conscientious doctors, we cannot escape just criticism. The considerations here set forth, I believe, have established the need for continued medical education which I stated was obviously the first step.

Reference has been made to the unsatisfactory and even chaotic condition of internships as at present existing. It is here that the young doctor gets his first real independent responsibility. It is here that he gets his first continuous opportunity to observe illness in its entirety. It is here that he is confronted with the actual application of the principles learned in the basic sciences to which he had some introduction in the clinical teaching of his pregraduate days. It is of the utmost importance that he should be under the tutelage of men who are concerned with his development; who feel a keen interest in aiding this development and who take a satisfaction in training those who will subsequently fill their places. It is therefore essential that the professional staff of the hospital shall be organized as a teaching unit in the same way that the faculty of the medical college is organized as a teaching unit. Much thought and constructive effort has been placed on the development of the college curriculum and as at present administered in this country we have a confidence that it is reasonably sound pedagogically. The same thought must be given to developing the hospital organization in the same way.

It would give me the utmost satisfaction if I were able to present to you an ideal hospital curriculum including training in the various clinical fields, and the laboratories, as well as giving due respect to the basic sciences and literary attainment. Unfortunately, I find myself totally unable to do this, but it is my earnest plea that this question receive thoughtful consideration and constructive

effort on the part of educators and hospital administrators. At the present time I am particularly concerned in pointing out to you that it is a crying need and that its adequate solution is perfectly possible, as is proved by attention to what has been accomplished when the medical profession sets its mind seriously upon the solution of such a problem. I have already alluded to two examples, one having to do with the tremendous improvement in our undergraduate medical teaching; and the second with the enthusiastic coöperation of the hospital in this program when the need was pointed out.

It is our hope that we may be able to present the problem of the continued education of the doctor; its present unsatisfactory position; the crying need for its correction and the hope for definite results in such a way that the ways and means may be found to give this whole subject the study that it requires and the help that must be extended to it if advantage is to be taken of the opportunities that lie before us. In this way, at some future date, it will be possible to present to you that well thought out, efficiently functioning curriculum for the hospital interns which I have just regretted I cannot lay before you today.

Having carried our recent graduate through his internship which, if this plan succeeds, will be a direct continuation of his undergraduate education, the even more difficult problem confronts us of guiding him through the subsequent three to five years. A certain number will continue their studies within the hospital organization as an integral part of it, in the position of residents, or other members of the professional staff. Such will inevitably be a part of the machinery having to do with the problem of interns which we have just discussed. These men will be the strong individuals who are endowed with those qualities that fit them for leadership. The number that can so continue their training is strictly limited and constitutes a small portion of those who have passed through the preliminary stages. What will become of the others assuming that they have actually received sound educa-

tional value while serving as interns? The time has not arrived when they should be left to shift for themselves in a hit or miss fashion. In the 130 hospitals in New York City of which 30 have shown a sympathetic attitude toward this whole subject by organizing themselves into the Board of Advanced Medical Education, there are sufficient opportunities to allow educational advantages for practically the entire number of younger doctors in the city who, at the stage of development to which they now have been brought, have demonstrated their fitness to go on in the profession.

In recent years, not only in New York but in other communities, there has been much agitation over what is loosely known as the "open hospital." A great deal of discussion has developed along poorly thought-out lines and has resulted in the advocacy of hopelessly impractical and unproductive hypotheses. Underlying this, however, is a perfectly sound central conception; namely, that it should be possible to so organize hospitals that their educational facilities shall be available to, as nearly as possible, the entire community. Not infrequently the discussions have centered around the economic injustice of limiting the facilities of the hospitals to a certain so-called favored few. In my opinion, this is unsound and not helpful. I am strongly of the opinion that if we will furnish the educational opportunities to our doctors and place before them a clientele which is satisfied that it will receive competent care, individually and collectively; and that the public health interests will be adequately considered and safeguarded; then automatically the economic problem of the medical profession will be largely solved. The public will pay for such service gladly, and in sufficient amount so that every member of our profession who thoroughly and conscientiously trains himself, will have ample opportunity to be paid adequately for his effort. I cannot expect full agreement with this conception. But I am impressed with the fact that, except in times of great stress, those members of the profession who have had adequate educa-

tional opportunities and have utilized these to the best advantage, receive sufficient economic support for the services they render to become respected and self-respecting members of the community. Barring extraneous misfortune, those who find life too confined and cramped because of economic pressure, have failed in one or the other of these requisites.

Our program then, is somewhat as follows: A careful appraisal of all the internships at present in the various hospitals of the metropolitan district should be made. We already have information as to the number of these; the number of beds provided; the fact as to whether they are so-called straight or rotating service; and in a very general way the type of service that is offered. We must be informed, by an analysis made by trained and competent observers, as to actual details. It will be necessary to study the various hospitals and learn the value of the educational training that the interns are receiving. While such study is in progress, material will be gathered to indicate how the various services can be best utilized with the facilities at their disposal to meet the object we have in mind. Since these hospitals are exceedingly varied in their activities, organization, financial status and so forth, it is quite obvious that each one will have to be considered as an entity. It is probable, however, that they will fall into very definite groups and that these groups will be able, more or less, to follow one systematized plan. The material at hand from such an investigation will give accurate information as to how the laboratory service, and even the basic medical sciences, shall be fitted into the general picture. With such complete information, one would be in a position to know the type of educational training each hospital can be developed to offer, and where needed a definite program could be formulated as a basis for obtaining the requisite financial support.

The hospitals of New York afford a large number of residences, which are filled by men who have received the training of an intern. Many of these are excellent educa-



tionally and are much sought after. The majority of them are in special fields and, as has already been learned, they are often held by men who have not had as much training in general medicine as is desirable. In any case the number of such residences must be limited and will only provide educational facilities for the more favored and more competent. Therefore, the problem of helping the rank and file of our younger doctors, immediately after they have left their internship, is one of utmost importance in the whole plan. We know that in the metropolitan district and probably in every community there are vast educational facilities that are inadequately used. This applies particularly to those institutions which are not actively engaged in undergraduate teaching. Even in many of those, the outpatient department fails to yield more than a small part of its educational advantage. Outpatient departments properly organized and giving true value to education are the very best places in the world for a young man to get invaluable clinical experience. Imperfectly organized and badly administered, they may well be the graveyard of his aspirations and the actual grave of his previous, carefully acquired scientific trend.

It seems to me that the most vital element in this plan is concerned with creating the will to teach. With this developed, there can be no question that a means of giving the earnest young doctors full educational opportunities will be found.

While the use of the in-service of the hospital to cover this special period is more difficult, I am of the opinion that the careful study we are advocating will also find opportunity for a greatly increased use of this service.

You will have recognized the validity of our being staggered by the magnitude of the undertaking we have in mind, when its full import was presented to us. The fact that we have already received, not only a sympathetic, but a really enthusiastic response from 30 of our hospitals and that a number of them have actually set up splendidly

functioning plants, encourages us to believe that the will to help already is in existence. This encouragement gives us the impetus to go forward. The consummation of the plan cannot be reached during the period of activity of myself or of many of the men who are working with us. But we intend to carry it forward far enough so that the need will be fully demonstrated and the road to follow plainly blazed.

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## AWARD OF ALEXANDER COCHRAN BOWEN SCHOLARSHIP

The Alexander Cochran Bowen Scholarships for this year have been awarded to Dr. Henry B. Kirkland and Dr. Charles W. Layne. The Scholarships amount to \$1900 each and are intended to provide for one year of foreign study in a clinical subject. They are open to recent graduate interns, men or women, of hospitals in New York City which accept charity patients. There were twelve applicants for this year's Scholarships.

Dr. Kirkland obtained his A. B. degree from Princeton University and graduated in medicine from Cornell University in 1928. He served a two-year internship on the Second Medical Division of Bellevue Hospital and is at present concluding a year as Assistant Pathologist in the same institution.

Dr. Layne graduated in medicine from Emory University in 1928. He served a two-year internship on the Fourth Medical Division of Bellevue Hospital and is at present at the Craig House, Beacon, N. Y.

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## EXTENSION TO ACADEMY BUILDING

The report of the Committee on Activities adopted by the Academy in January 1929, outlined the present and possible future activities of the Academy, and stressed emphatically the importance of an extension to the present building. It had been recognized when the present building was constructed that only the activities then under way could be housed in it. The report therefore urged the importance of an extension and subsequently the Council authorized the appointment of a special Committee on Gifts and Bequests of which the President was Chairman, to secure additional funds for an extension and additional endowment.

In June 1930, a letter was sent to Mr. Edward S. Harkness, asking if he would be interested in making a grant toward the construction of an addition at a cost of \$350,000, or in making a donation toward \$400,000 of additional endowment. The Committee was very much gratified to hear from Mr. Harkness in July 1930, that he would be glad to give the sum of \$350,000 for the construction of an addition, provided the Academy was able to secure \$400,000 of endowment prior to July 1, 1931.

### \$400,000 SECURED.

It was reported to the Council at its meeting on May 27, 1931, that \$403,137.92 had been obtained, which includes a tentative grant from one of the Foundations of \$50,000 or more, which has not yet been officially confirmed.

At the January meeting of the Board a Building Committee was appointed, consisting of Drs. Duel, Pool, Niles, Cohn, Hartwell, Williams and Malloch. Messrs. York and Sawyer were shortly instructed to prepare preliminary drawings for an extension. The architects prepared two plans, one for the construction of an addition over the present auditorium which would extend up to the height of the

present main building, including two new stack stories, and an alternative plan which provided for an addition to be built over the auditorium up to the level of the fifth story, set back from the street, and new construction to be built on the present vacant yard, which would provide more adequate facilities for the Library, and an exterior more in keeping with the general style of the building. Estimates were obtained on these alternative projects and it was found that the smaller one would cost \$350,000 and the larger \$450,000.

The larger plan was reported to Mr. Harkness and the matter discussed in detail with his representative with the result that Mr. Harkness has offered an extension of time of six months, until December 31, 1931, so that the Academy may have an opportunity to secure an additional \$100,000 in order that the larger extension can be constructed. On May 27, 1931 the Council voted to endeavor to secure an additional \$100,000 prior to December 31, 1931.

The Council feels very much gratified that it has been possible to secure gifts and pledges during the past winter sufficient to increase the endowment fund by \$400,000, and is encouraged to endeavor to raise \$100,000 more in the next six months.

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## LIBRARY NOTES

### HOURS DURING THE SUMMER

From June 15 until September 15 inclusive, the Library will be open on week days from 9 a.m. to 5 p.m., on Wednesdays from 9 a.m. to 10:30 p.m., and on Sundays from 10 a.m. to 5 p.m.

### RECENT ACCESSIONS

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- Trial of Harold Greenwood.  
Edinburgh, Hodge, [1930], 347 p.
- Underwood, E. A. A manual of tuberculosis for nurses.  
Edinburgh, Livingstone, 1931, 272 p.
- Urban, K. Die Chirurgie des Kropfes.  
Leipzig, Deuticke, 1931, 84 p.
- Valdés Lambea, J. Tuberculosis de los niños.  
Madrid, Morata, 1930, 66 p.
- Vallery-Radot, J. L. P. and Heimann, V. Hypersensibilités spécifiques dans les affections cutanées.  
Paris, Masson, 1930, 146 p.
- Vallery-Radot, J. L. P. and Roquès, L. Les phénomènes de choc dans l'urticaire.  
Paris, Masson, 1930, 231 p.
- Wallace, J. The state health departments of Massachusetts, Michigan, and Ohio.  
N. Y., Commonwealth Fund, 1930, 192 p.
- Warthin, A. S. The physician of the Dance of Death.  
N. Y., Hoeber, 1931, 142 p.
- Waterston, D. Anatomy in the living model.  
London, Hodder, 1931, 255 p.
- Watson, J. K. A handbook for senior nurses and midwives. 2. ed.  
London, Milford, [1931], 676 p.
- Webb-Johnson, C. The care of the child from birth to puberty.  
London, Macmillan, 1930, 127 p.

- Weinert, H. Menschen der Vorzeit:  
Stuttgart, Enke, 1930, 139 p.
- Wells, H. G.; Huxley, J. S. and Wells, G. P. The science of life.  
London, Cassell, [1931], 895 p.
- Werner Zoëge von Manteuffel, Professor der Chirurgie in Dorpat, 1857-1926.  
Stuttgart, Ausland und Heimat Verlags-aktiengesellschaft, 1931,  
188 p.
- Williamson, N. B. A handbook on diseases of children.  
Edinburgh, Livingstone, 1931, 290 p.
- Wollenweber, N. Der beamtete Arzt.  
Berlin, Heymann, 1930, 252 p.
- Wyatt, B. L. Chronic arthritis and rheumatoid affections.  
N. Y., Wood, 1930, 166 p.
- Zand, (Mme.) N. Les plexus choroïdes; anatomie, physiologie, pathologie.  
Paris, Masson, 1930, 140 p.
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# PROCEEDINGS OF ACADEMY MEETINGS

MAY

STATED MEETINGS

Thursday Evening, May 7, at 8:30 o'clock

ORDER

I. EXECUTIVE SESSION

Election of Fellows

II. HERMANN MICHAEL BIGGS MEMORIAL LECTURE:

The Control of Chronic Diseases, George H. Bigelow, Commissioner of Public Health, State of Massachusetts.

Thursday Evening, May 21, at 8:30 o'clock

I. EXECUTIVE SESSION OF THE ACADEMY

Election of Fellows

II. THE EIGHTH HARVEY LECTURE

"Tissue Resistance and Immunity," Frederick P. Gay, College of Physicians and Surgeons, Columbia University

ALFRED E. COHN, President Harvey Society

DAYTON J. EDWARDS, Secretary Harvey Society

SECTION MEETINGS

SECTION OF SURGERY

Friday Evening, May 1, at 8:30 o'clock

ORDER

I. EXECUTIVE SESSION

a. Election of Officers:

For Chairman—Robert H. Kennedy

For Secretary—William Barclay Parsons, Jr.

For member of Advisory Committee—Otto C. Pickhardt

b. Reading of the Minutes

II. PRESENTATION OF CASES

a. 1. Fracture of the head of the radius (5 cases)

2. Suppurative pericarditis—recovery by aspiration, J. V. Bohrer

b. Cases illustrating the papers of the evening, Edward C. Brenner, Nelson W. Cornell

III. PAPERS OF THE EVENING

a. Total volvulus, Edward C. Brenner

b. Intestinal obstruction with a report of 230 cases, Nelson W. Cornell

IV. GENERAL DISCUSSION

SECTION OF DERMATOLOGY AND SYPHILOLOGY

Tuesday Evening, May 5, at 8:30 o'clock

ORDER

I. EXECUTIVE SESSION

a. Election of Officers:

For Chairman—Joseph J. Eller

For Secretary—Leo Spiegel

For member of Advisory Committee—George M. MacKee

b. Reading of the Minutes

II. PRESENTATION OF CASES

a. Cases from Mt. Sinai Hospital

b. Brief demonstration by Dr. Joseph H. Globus and Dr. Sol. Ginsburg on "salvarsan pericapillary encephalorrhagia"

III. GENERAL DISCUSSION

Examination of cases is limited to members and their invited guests.

SECTION OF OTOTOLOGY

Friday Evening, May 8, at 8:30 o'clock

ORDER

I. EXECUTIVE SESSION

a. Election of Officers:

For Chairman—René H. Huvelle

For Secretary—Marvin F. Jones

For member of Advisory Committee—Hugh B. Blackwell

b. Reading of the Minutes

II. REPORT OF CASES

a. Bilateral labyrinthine hemorrhage in a case of aplastic anemia, M. Rosenbluth (by invitation)

b. Two unusual cases of labyrinthitis, Charles Manley Griffith (by invitation)

III. PAPER OF THE EVENING

Vestibular tests on animals with experimental lesions of the nervous system, with lantern demonstration, F. H. Pike, Ph.D., Columbia University (by invitation), Page Northington (by invitation)

IV. GENERAL DISCUSSION

JOINT MEETING

of the

SECTION OF NEUROLOGY AND PSYCHIATRY

and

THE NEW YORK NEUROLOGICAL SOCIETY

Tuesday Evening, May 12, at 8:30 o'clock

ORDER

I. EXECUTIVE SESSION

a. Election of Officers:

For Chairman—Joseph H. Globus

For Secretary—Byron Stookey

For members of Advisory Committee—Michael Osnato, 5 years;  
Thomas K. Davis, 1 year (to fill the unexpired term of Byron  
Stookey, resigned)

b. Report of the committee appointed to outline new qualifications  
for Fellowship in the Academy

c. Reading of the Minutes

## II. CLINICAL PRESENTATIONS

a. Postoperative result of a chronic right sided hematoma with ipso-  
lateral pyramidal tract signs, Ira Cohen

b. From the Neurological Institute

1. Family periodic paralysis (motion pictures), Edwin G. Zabriskie,  
Angus MacDonald Frantz

2. Hypertrophic interstitial neuritis, Charles A. McKendree, A.  
H. Rubinowitz (by invitation)

## III. PAPERS OF THE EVENING

a. The effects of total removal of the left temporal lobe in right  
handed persons; localization areas of the brain concerned with  
speech, Walter E. Dandy, Johns Hopkins Hospital, Baltimore  
(by invitation)

b. The extradural ventral chondromas. Their favorite sites, the spinal  
cord and root symptoms they produce and their surgical treat-  
ment, Charles A. Elsberg

IV. DISCUSSION—Foster Kennedy, Charles A. Elsberg, Israel Strauss,  
Henry A. Riley, Byron Stookey, Joseph E. J. King, Leo Davidoff  
(by invitation)

## V. GENERAL DISCUSSION

SECTION OF HISTORICAL AND CULTURAL MEDICINE

Wednesday Evening, May 13, at 8:30 o'clock

### ORDER

### I. EXECUTIVE SESSION

a. Election of Officers:

For Chairman—Karl Vogel

For Secretary—Howard Reid Craig

For member of Advisory Committee—Frederick Peterson

b. Reading of the Minutes

### II. PAPERS OF THE EVENING

a. A note on the medical works of Oliver Wendell Holmes, Edgar  
M. Bick (by invitation)

b. Rabanus Maurus, "De Rebus Divers," 1467 Incunabula Medica No.  
1 (Osler), Everett Colgate Jessup

c. Early literature on arthritis, with exhibits, Reginald Burbank

### III. GENERAL DISCUSSION

SECTION OF PEDIATRICS

Thursday Evening, May 14, at 8:30 o'clock

### ORDER

### I. EXECUTIVE SESSION

a. Election of Officers:



For Chairman—Herbert B. Wilcox

For Secretary—John Caffey

For member of Advisory Committee—Hugh Chaplin

b. Reading of the Minutes

## II. PAPERS OF THE EVENING

a. A method for the continuous infusion in infants, John Mitchell Brush (by invitation)

b. The treatment of toxicosis with the aid of a continuous intravenous drip of glucose solution, Samuel Karelitz

Discussion, Bela Schick

c. A comparison of the blood chemistry in intestinal intoxication of infants, and in adrenalectomized animals. Treatment of intestinal intoxication with an adrenal cortex extract, Aubrey B. MacLean, Ruth Sullivan (by invitation), R. L. Zwemer (by invitation)

## III. GENERAL DISCUSSION

### SECTION OF ORTHOPEDIC SURGERY

#### ORDER

#### I. EXECUTIVE SESSION

a. Election of Officers:

For Chairman—Isadore Zadek

For Secretary—Mather Cleveland

For member of the Advisory Committee—Alan DeForest Smith

b. Reading of the Minutes

#### II. PRESENTATION OF CASES

a. The result of reconstruction of flexor tendon in a finger by fascial graft, Mather Cleveland

b. Cases illustrating the treatment of tennis elbow, Louis Carp

#### III. PAPERS OF THE EVENING

a. Tennis elbow as caused by radiohumeral bursitis. Its anatomical, clinical, roentgenological and pathological aspects, with a suggestion as to treatment, Louis Carp

b. 1. Tensile strength and elasticity tests of human fascia lata

2. A new needle and suture carrier for living sutures, Charles Murray Gratz (by invitation)

#### IV. GENERAL DISCUSSION

### SECTION OF OPHTHALMOLOGY

Monday Evening, May 16, at 8:30 o'clock

#### ORDER

#### I. EXECUTIVE SESSION

a. Reading of the Minutes

b. Election of Officers:

For Chairman—Mark J. Schoenberg

For Secretary—Algernon B. Reese

For members of the Advisory Committee—Ernest F. Krug, 5 years;  
Bernard Samuels, 3 years (to fill unexpired term of Edgar S.  
Thomson, deceased)

II. CASE PRESENTATION

- a. 1. A modified Motais operation
2. Two cases of exenteration with skin graft (lantern slides), Daniel  
B. Kirby
- b. Total ophthalmoplegia, Joseph S. Hory

III. DEMONSTRATIONS

- a. Cysts of the cornea (lantern slides), Milton L. Berliner
- b. 1. Hemorrhage within optic nerve sheath in an irradiated fetus  
(lantern slides)
2. Spongio-neuroblastoma of optic nerve, in von Recklinghausen  
disease (lantern slides), David Wexler, Isadore Goldstein

IV. PAPER OF THE EVENING

Syphilitic optic atrophies, Joseph Earle Moore, Baltimore (by invitation)

V. GENERAL DISCUSSION

SECTION OF MEDICINE

Tuesday Evening, May 19, at 8:30 o'clock

ORDER

I. EXECUTIVE SESSION

- a. Election of Officers:  
For Chairman—Harold E. B. Pardee  
For Secretary—Robert F. Loeb  
For member of Advisory Committee—Lewis F. Frissell
- b. Reading of the Minutes

II. PAPERS OF THE EVENING

- a. Recent important contributions to nephritis, Arthur M. Fishberg  
Discussion, Herman O. Mosenthal, George Baehr
- b. Recent contributions in tuberculosis treatment, Edgar Mayer,  
Saranac Lake (by invitation)  
Discussion, S. Adolphus Knopf, Henry T. Chickering, Marion B.  
Sulzberger
- c. Recent progress in diseases of metabolism, Walter W. Palmer  
Discussion, Eugene F. DuBois

III. INFORMAL DISCUSSION

SECTION OF GENITO-URINARY SURGERY

There was no meeting of the Section in May.

Section officers for the ensuing year were elected at the April meeting as follows:

Chairman—Meredith F. Campbell  
Secretary—George F. Hoch  
Member of Advisory Committee—Archie L. Dean, Jr.

SECTION OF OBSTETRICS AND GYNECOLOGY  
Tuesday Evening, May 26, at 8:30 o'clock

ORDER

- I. EXECUTIVE SESSION
  - a. Election of Officers:  
For Chairman—Gerard L. Moench  
For Secretary—Francis W. Sovak  
For member of Advisory Committee—Hervey C. Williamson
  - b. Reading of the Minutes
- II. CASE REPORTS AND PRESENTATION OF NEW INSTRUMENTS
  - a. Pelvic insufflation syringe, Francis W. Sovak
  - b. An unusual case of neonatal pulmonary atelectasis, Joseph E. Corr (by invitation)
- III. PAPERS OF THE EVENING
  - a. Postural treatment of intracranial hemorrhage in the new-born, Edwin A. Riesenfeld  
Discussion opened by Leo Davidoff (by invitation), Morris Leff, Simon Robert Thau
  - b. The development of the inner female sexual organs, Prof. Ete Burg, Pecs University, Hungary (by invitation)  
Demonstration by models
- IV. GENERAL DISCUSSION
  - V. Discussion of qualifications for Fellowship in the Section following the report of the Special Committee

SECTION OF LARYNGOLOGY AND RHINOLOGY  
Wednesday Evening, May 27, at 8:30 o'clock  
*at the*  
ACADEMY OF MEDICINE

ORDER

- I. EXECUTIVE SESSION
  - a. Election of Officers:  
For Chairman—Westley M. Hunt  
For Secretary—Arthur S. Wilson  
For member of Advisory Committee—Duncan Macpherson
  - b. Report of Advisory Committee on qualifications for Fellowship in Rhino-Laryngology
  - c. Reading of the Minutes
- II. REPORT OF CASES:  
Foreign body in lung—2 cases, George R. Brighton
- III. PAPERS OF THE EVENING
  - a. Studies in sinus infection, J. Wynne Pugh (by invitation)
  - b. Paralysis of the vocal cords, Alfred Michaelis
  - c. Agranulocytic angina, James W. Babcock
- IV. GENERAL DISCUSSION

THE NEW YORK ROENTGEN SOCIETY  
In Affiliation with  
THE NEW YORK ACADEMY OF MEDICINE  
Monday Evening, May 18

ORDER

- I. 8:30 P. M.  
Demonstration of interesting cases and roentgenograms
- II. 9:00 P. M.
  - a. Observations on the application of large doses of highly filtered high potential x-rays, Maurice Lenz
  - b. Comparison of filters in high voltage roentgen therapy, Mr. C. B. Braestrup (by invitation)
  - c. The changes in quality of roentgen rays after their passage through tissue, Edith Quimby, Robert McNattin
- III. GENERAL DISCUSSION  
To be opened by Francis Carter Wood, G. Failla
- IV. EXECUTIVE SESSION  
ROSS GOLDEN, President  
J. BENNETT EDWARDS, Secretary

NEW YORK MEETING  
of the

SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE  
Under the auspices of

THE NEW YORK ACADEMY OF MEDICINE  
Fifth Avenue and 103 Street

Wednesday, May 20, 1931, at 8:15 P. M.

- I. Regeneration of Virus Myxomatousum (Sanarelli) in the Presence of Cells of Exudates Surviving *in Vitro*, B. Benjamin and T. M. Rivers
- II. Streptococcus Leucocidin and Clasmatoocyte Resistance, F. P. Gay and F. Oram
- III. Oral Immunization of Humans Against Pneumococcus as Determined by Increased Protective Antibody Content of Serum, V. Ross
- IV. Spermagglutination by Bacteria, L. Rosenthal
- V. Biochemical Studies of Human Semen. Factors Affecting Migration of Sperm Through the Cervix, E. G. Miller, Jr., and R. Kurzrok
- VI. Rate of Decalcification and the Sites of Bone Lesions in Experimental Hyperparathyroidism, H. L. Jaffe, A. Bodansky and J. E. Blair
- VII. A Study of the Allergic Phenomena in the Central Nervous System, C. G. Burn and K. H. Finley (introduced by R. Hussey)
- VIII. The Permeability of the Lymphatic Wall, P. D. McMaster and S. S. Hudack

IX. The Breakdown of the Lymph Transport, S. S. Hudack and P. D. McMaster

PEYTON ROUS, President

A. J. GOLDFORB, Secretary

NEW YORK PATHOLOGICAL SOCIETY

In Affiliation with

THE NEW YORK ACADEMY OF MEDICINE

Thursday Evening, May 28, at 8:30 o'clock

ORDER

I. PAPERS OF THE EVENING

- a. A case of foreign body in the orbit, Reuben Goodman (by invitation)
- b. Osteogenic sarcoma-like tumor of the metacarpal bone, Henry L. Jaffe (by invitation), Leo Mayer
- c. Heredity of the agglutinogens M and N of Landsteiner and Levine with particular reference to determination of paternity, Alexander S. Wiener (by invitation), Max Lederer
- d. Brain lesions in influenza, Irving Sands (by invitation)

II. EXECUTIVE SESSION

LEILA CHARLTON KNOX, President, St. Luke's Hospital

BERYL H. PAIGE, Secretary, The Babies' Hospital

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## DR. PAOLO DE VECCHI

Dr. Paolo De Vecchi of New York and formerly of San Francisco, was born in Quattordio, near Turin, Italy, on September 26, 1847. His parents were Margherita Berruti and Dr. Guiseppe De Vecchi, the latter an eminent physician of Turin. He died May 30, 1931.

In 1872, he received his medical degree from the University of Turin. Soon after graduating, he was made Assistant Surgeon of St. John's Hospital of Turin and was later appointed Court physician to H. R. H. the Prince Amedeo of the House of Savoy.

While a student at the University, he volunteered with General Guiseppe Garibaldi and served in the Roman campaign of 1867 and was severely wounded at the battle of Monterotondo (near Rome).

Three years later, in 1870, he volunteered in the Franco-Prussian War as surgeon with the "Ambulance Turinoise" of the Red Cross which was in action at the battle of Sedan. For his services he received decorations from the French and Italian Governments.

In 1873, he was sent by the Italian Government to South America for scientific study and to make a thorough survey of Italian emigration in South America. He received a decoration from his Government for the work accomplished. In 1880, obtained a five months' leave of absence from Prince Amedeo of Savoy and St. John's Hospital, for the purpose of visiting the United States where he was desirous of studying orthopedic surgery under the well known surgeon, Professor Louis Sayre of New York, and other surgeons of Boston and Baltimore, and also to visit and study American hospitals and methods.

While in New York, he was invited to perform an operation in San Francisco, where he finally settled and practised surgery for twenty-five years. He introduced on the Pacific Coast the Lister method of antiseptis.

In 1885, he married Miss Margaret Follis of San Francisco and they had three children. He became a naturalized citizen of the United States in 1887. During his residence in California, he acted as correspondent for two important daily newspapers and several medical journals in Italy. He also edited in San Francisco, "The Lancet," a medical journal, and contributed a great many articles on medicine and surgery to medical journals here and abroad. His most recent and important publications are:

"Modern Italian Surgery"

"A Discourse on Divorce"

"How Italy Won the War" (translation of a book written by Colonel Edgar E. Hume of the U. S. Army Medical Corps).

In 1905, he retired after a most successful and brilliant medical career and devoted his time to travel and writing. In 1910 he settled in New York and established a residence at 43 Fifth Avenue.

He received from His Majesty the King of Italy, for services rendered, the decoration of:

Cavaliere della Corona d'Italia—and also

Commendatore dei S. S. Maurisio e Lazzaro—one of the highest decorations awarded to civilians by the Italian Government. He was also awarded a number of other decorations for his military, scientific and philanthropic works.

In California, he was actively identified in business and charitable works besides his medical profession. He organized a number of charities for his countrymen living in California and he was the founder of St. Joseph's Hospital, which is now the largest public hospital in San Francisco, and also the Adler Hospital, now known as the Dante Sanitorium, in San Francisco. He was one of the organizers, and for a time was President of the Italian Swiss Colony, a very large agricultural colony in the northern part of Cali-

fornia, as also the Italian-American Bank which was lately absorbed by the Bank of America of California. In New York, he served as a trustee of the Mulberry Community House and the Italian Welfare League and as a Director of the Banca Commerciale Italiana and as a Director of the Di Giorgio Fruit Corporation.

Dr. De Vecchi was elected a Fellow of the Academy January 3, 1918; he was a member of the Royal Academy of Turin, Fellow of the American College of Surgeons, Member of Medical Society of the State of New York and State of California, a member of the University Club of New York, life member of the Dante Alighiere, life member of The California Academy of Science, founder and charter member of the Olympic Club of San Francisco, one of the founders of the Burlingame Country Club, The Family Club, the Sierra Club of San Francisco and a member of the Bohemian and Pacific Union Clubs of San Francisco and a member of the Geographic Society of California.

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## DEATHS OF FELLOWS OF THE ACADEMY

JOSEPH BERNARD COHEN, M.D., 948 Grand Concourse, New York City; graduated in medicine from New York University and Bellevue Hospital Medical College, New York City, in 1907; elected a Fellow of the Academy November 6, 1919; died, May 29, 1931. Dr. Cohen was a Fellow of the American Medical Association, a member of the County and State Medical Societies, a member of the Society of Alumni of Lebanon Hospital and Associate Physician to Lebanon Hospital.

CHARLES NORTH DOWD, M.D., 149 Lake Avenue, Saratoga Springs, N. Y.; graduated in medicine from the College of Physicians and Surgeons, New York City, in 1886; elected a Fellow of the Academy December 5, 1889; died, May 24, 1931. Dr. Dowd was a Fellow of the American Medical Association, a Fellow of the American College of Surgeons; a member of the County and State Medical Societies, a member of the American Surgical Association, a member of the International Surgical Society and a member of the New York Surgical Society; a member of the Roosevelt Hospital Alumni Association, Consulting Surgeon to Roosevelt, Memorial, St. Mary's Hospital for Children and Saratoga and Reconstruction Unit of Post-Graduate Hospital. While in New York Dr. Dowd was Professor of Clinical Surgery at the College of Physicians and Surgeons.

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# BULLETIN OF THE NEW YORK ACADEMY OF MEDICINE

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VOL. VII

JULY, 1931

No. 7

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## ANNUAL GRADUATE FORTNIGHT MENINGOCOCCUS INFECTIONS INCLUDING MENINGITIS\*

W. W. HERRICK

Visiting Physician, Presbyterian and Sloane Hospitals

Any facts about an infection for which we have a satisfactory treatment have double value. Happily meningococcus infections are in this class. It may therefore be profitable to review such recent advance in knowledge of this disease as may be of value and at the same time to go over well established essential facts about it.

Because the meningococcus is an obligatory human parasite and does not infect lower animals under ordinary conditions, knowledge of this disease must be derived largely from the bedside. For this reason the clinician and pathologist are in position to speak with more authority than is the experimental worker.

Within recent years no facts of importance in regard to the bacteriology and immunology of this disease have been forthcoming. Authorities are still somewhat vague about the mechanism of immunity. Present opinion accords to phagocytosis and agglutination the most prominent place in this process. The organism has been found in almost every organ of the body. It has been repeatedly shown in the air passages throughout their entire extent; in the pleura, pericardium, peritoneum, circulating blood, endocardium, skin, joints, meninges, and middle ear. It has

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\*Delivered October 31, 1930.

been associated with endocarditis, septicemia, meningitis, pneumonia, pleurisy, peritonitis, epididymitis, adrenal necrosis and hemorrhage, encephalitis, suppuration of the paranasal sinuses, tonsillitis and pharyngitis. Being one of the pyogenic cocci, it produces pus wherever it may lodge. In many of its clinical and laboratory properties, it is analogous to the pneumococcus. Like the pneumococcus the meningococcus is a variable species. It may be divided into definite groups or types with varying immunological properties. It may be that these groups are not fixed but vary in different epidemics and from time to time in a given epidemic, thus defying arbitrary classification. The recognition of this matter is of the utmost importance in the preparation and administration of anti-meningococcus serum.

One may conveniently and logically divide infections with this organism into three stages: The first, or carrier stage, is an involvement of the upper air passages. The oro- or nasopharynx, tonsils, and paranasal sinuses are singly or severally involved in every active case. This involvement is usually of short duration amounting to a few days. It may be followed by the other phases of the disease or the process may go no further.

There are chronic carriers who continuously or intermittently emit the meningococcus in the nasal discharge and sputum. These may be transitory, intermittent or permanent hosts of this micrococcus. These individuals keep the infection alive during non-epidemic periods. It is probable that the chronic carrier is himself immune to the infection.

The infection may not go beyond this first or carrier stage. This seems to be borne out by the observed frequency of mild infections of the upper respiratory tract in communities in which meningococcus infection is rife. Coryza, pharyngitis, sinusitis or tonsillitis with the diplococci obtainable sometimes in pure culture may occur as an isolated manifestation of this infection. The exudate in the nasopharynx and oropharynx is very viscid and

patches which may appear on lymphoid tissue are superficial and grayish, never very dense. In addition there is much local congestion. There may be a mild toxemia or no symptoms of importance.

The second stage of this infection is a bacteremia. Demonstration of this stage, which is the direct result of clinical studies made during the World War, has apparently solved the long debated question as to the avenue of transport of the diplococci from the upper air passages to the meninges. It may be said that the proof of a meningococcemia is ample and has been obtained under conditions of both military and civilian life. On the contrary, satisfactory volume of proof of the direct transmission of the infection from the nasopharynx or paranasal sinuses to the meninges is lacking. The clinical picture of meningococcemia is quite definite and may be readily recognized by the alert and experienced clinician. With or without the preliminary infection of the upper air passages, the patient suddenly becomes prostrated and febrile. The temperature in the average case is around 102. It may be subnormal. It may be very high. Frequently there is chill at onset. Of striking interest is the effect of the toxin on the higher centers. Patients are stupefied. The expression is characteristically blank. Replies are in monosyllables. Active delirium is rare. There is a tendency to lie quietly, to take little note of surroundings and to resent interference. Attempt at movement is resisted in a protesting querulous manner. Movement is painful. There is complaint of a general soreness and aching all over the body which may simulate acute polyarthrits. The skin gives us very valuable evidence at this stage of the disease. There is evidence of a vasomotor disturbance. Patients present a mottled pallor sometimes with a patchy suffusion of the face. There is a redness of the conjunctivæ. Tache cérébrale may be observed. Almost diagnostic is the hemorrhagic rash. Pathologically this consists of minute hemorrhages into the skin. Usually of pin-head size, these may reach a diameter of several inches or in fulminating cases amount

to a diffuse purpura. Like other hemorrhagic rashes, they do not disappear on pressure. They continue bright for two or three days when they fade leaving a rusty stain. Most commonly they occur about the shoulder and pelvic girdle; in more severe cases, over the trunk, conjunctivæ, mucosa, extremities or even the face. They come out very quickly and within one to two hours a patient previously without skin lesions may show an astounding number of these purpuric spots. From these the ancient term "spotted fever" arises. In some severe cases large hemorrhagic areas will undergo necrosis resulting in considerable and often deep destruction of skin and even of muscle. Such lesions are very suggestive of vascular thrombosis. At necropsy these hemorrhagic lesions are apparent on all the serous surfaces. They are undoubtedly the cause of the early arthralgia or arthritis so common in the septic stage of meningococchemia. In the more chronic cases, particularly the relapsing types without meningitis, one sees a maculo-papular roseola very like the rose spots of typhoid fever except in size. Many of these spots are one-half inch in diameter. They are most common on the trunk and appear in groups. Usually they are rather sparsely distributed. They have been mistaken for chicken pox, typhoid fever or erythema nodosum.

Among the laboratory findings in meningococchemia a high polymorphonuclear leucocytosis is almost constant. In no other disease excepting pneumonia is there such an early and marked leucocytosis. The pulse is rapid. The blood pressure is low. The meningococcus may be obtained from the upper air passages; from the blood stream by appropriate blood culture methods or on direct smear; from the skin lesions and even from the clear cerebrospinal fluid. If detailed proof of a meningococchemia were required, one might find it in the reports of positive blood cultures obtained in the stage of the disease under discussion. In an epidemic in the army in 1917-18 in 12 consecutive cases under my own study a positive blood culture was obtained in 10. McLean and Caffey reported 14 positive blood cul-

tures in a series of 17 cases in children. Smithburn et al. reported 63.8 per cent of positive blood cultures in 119 cases. McLean and Caffey obtained meningococci on smear from the hemorrhagic skin lesions of children. Symptoms of meningeal irritation may be entirely absent at this stage or they may occur simultaneously with it. In some epidemics the stage of meningococcemia has recognizable duration from a few hours to a few days before the development of meningitis.

The metastatic phase of meningococcus infections is the one with which most of us are familiar. The meninges are involved in at least 90 per cent of the cases. This may occur so early as to appear to be the initial process of the disease. However, in epidemics in which control of material is possible and study can be carried out from the onset of any symptoms whatsoever, conditions such as obtain in military camps, in hospitals, industrial or other organizations, the early phase of this infection can usually be detected. It is probable that epidemics differ and that in some, certain of the septic manifestations of the disease are not prominent.

It is not necessary to recount in detail the symptoms and signs of meningitis. The bursting headache, vomiting, the frequent delirium, the irritability, the stiff neck, and the findings on lumbar puncture are known to every clinician.

Of special interest is the prevalence and the picture of the disease in small infants. This has been studied especially by McLean. This observer found that in addition to the classical signs of meningitis, a failure to nurse properly, an excessive irritability, bulging fontanel, ophthalmoplegia, or a Cheyne-Stokes' respiration in infants make important the consideration of a meningococcus meningitis.

The spinal fluid presents certain well defined phases in this disease. In the stage of meningococcemia it is clear, contains a normal amount of cells and usually a few extra-

cellular isolated diplococci. These may be obtained on culture when they are not found on smear of the centrifugalized specimen. An increase in globulin and in cells follows soon. At first the cells are largely mononuclear in type, probably desquamated ependymal cells; later polymorphonuclears appear in quantity. In a few hours polymorphonuclear cells are from 90 to 100 per cent of the white cells present while fibrin, red blood cells and meningococci complete the picture. At first the organisms are largely or wholly without the cells but as the process matures they become intracellular in localization. With satisfactory response to serum therapy or a spontaneous recovery, the polymorphonuclear cells gradually give place to lymphocytes, organisms disappear, the fluid gradually becomes clearer and less in quantity. A condition of hypersecretion of the fluid and increased pressure in the subarachnoid system may last for some time after the fluid approaches the normal in all other respects.

Certain mechanical accidents of the disease are of importance. In the early stages of meningitis there may be a great increase in the bulk of the entire encephalon due not only to the meningeal exudate but also to extreme congestion and to an encephalitis which may be characterized by engorgement of the vessels, edema and a perivascular exudate. The not infrequent encephalitis of meningococcus infection has been little stressed. This lesion may take the form of localized hemorrhagic and purulent exudate in the brain substance and may well account for some of the persistent symptoms in cases not yielding to treatment. The result of an acute increase in the bulk of the encephalon may be a wedging of the brain stem in the foramen magnum. Clinically this is evidenced by intense engorgement of the face and veins of the forehead, bursting, agonizing headache, wild delirium, often with a slow pulse and other evidence of increased intracranial pressure. Sudden death may result. In addition to the specific therapy, management should be by venesection, by

the use of Epsom salts in the alimentary tract and by injections of glucose intravenously.

The subarachnoid system is an accessory circulation. The fluid courses from its point of origin in the choroid plexus through the foramen of Monro, the aqueduct of Sylvius, the fourth ventricle, thence through the foramina of Luschka and Magendie to the subarachnoid spaces covering the brain, cerebellum and cord. Absorption into the lymphatic stream is by the pacchionian bodies and the sheaths of the cranial nerves. In meningitis organized exudate may close this circuit at any point resulting in accumulation of fluid and distention of the ventricles or other subarachnoid spaces proximal to the point of occlusion. This condition is known as subarachnoid block. It most commonly occurs at the foramina of Luschka and Magendie, occasionally in the aqueduct, rarely in a foramen of Monro or about the cord. In some cases defective absorption from the entire drainage field may account for hydrocephalus without obvious local subarachnoid occlusion. This state may be combined with hypersecretion. The result of block is an acute hydrocephalus or hydrocephalic meningitis. The important symptoms are increase in meningeal irritation, obtunded mentality, an irregular, intermittent temperature, rapid trophic disturbance characterized by wasting so that the patient may become almost a living skeleton; evidence of increased intracranial pressure as shown by slow pulse and elevated blood pressure, sometimes by choking of the optic disk. At necropsy one finds great distention of the ventricles and flattening of the convolutions. If unrelieved, death is almost certain. In some cases in children a chronic hydrocephalus results.

Polyarthritis is a prominent symptom in the early stages. It is probably associated with hemorrhage into the joint membranes. It may be very acute and a source of bitter complaint. It is one of the factors that compels the patient to remain quiet and immobile. This type of arthritis is transitory and clears away with the hemorrhagic rash. Another type is a mono-arthritis, usually affecting the



knee, occasionally other large joints. It is characterized by purulent exudate in which meningococci can usually be found. It is subacute in its course, rather late in its appearance, is of good prognostic omen and, after a variable duration, clears away without leaving any disability. An interesting feature is the relatively painless character of this meningococcic mono-arthritis. Swelling and exudate may be great but spontaneous pain or pain on movement is very slight. Cases of this kind may occur without meningitis. A relatively painless arthritis of the larger joints in which the local features are more prominent than the symptoms and in which the course is prolonged and particularly when accompanied by a maculo-papular rash should bring into consideration a general infection with the meningococcus. Not infrequently cases of this type are called purpura rheumatica, a term which may give verbal satisfaction but which should never be accepted as a final diagnosis.

Pericarditis is not infrequent. It is of the sero-purulent or fibrino-purulent type. While a serious complication, it is not necessarily fatal. It may be attended by a large amount of exudate requiring paracentesis.

Endocarditis is very infrequent. It is of the vegetative type and may involve either side of the heart. It is practically always fatal.

Meningococcic pleurisy, while rare, may occur and offers about the same problem as meningococcic pericarditis. It is doubtful if the pneumonia often associated with meningococcic infections is due primarily to this organism. Peritonitis does occur although very rarely. Epididymitis is a factor in some epidemics. It is not a florid process. Cases seldom have any symptoms except the local swelling which in my experience subsides without subsequent atrophy.

The eye may play an important part in the symptomatology of this disease. In the initial stage conjunctivitis is a feature. In the bacteremic stage petechial spots of

varying size occur in the conjunctivæ. Strangely enough these are not found in the retina. Meningococcic panophthalmitis is one of the most disturbing symptoms of the disease. Careful observation of its onset does not suggest that the avenue of infection is by the optic nerve sheaths; rather does it seem to indicate that the infection is from the blood stream. An intense congestion of the vessels of the sclera with severe pain and increased tension is the first feature. Rapidly the media become cloudy. Then the eye becomes infiltrated with pus. The tension later falls and the eye is destroyed. In only one case, that reported by McLean and observed by myself at the Babies' Hospital, has there been recovery after this process had become established. In this case there was complete restoration of vision. Usually, however, the sight is destroyed and the eye requires enucleation. I have more than once seen this process affect both eyes. From experience I am sure that enucleation in these cases should be deferred until the process becomes well walled off and active symptoms of the disease have been absent for some weeks.

Of the cranial nerves the first is very rarely affected. Anosmia may rarely be observed. The ophthalmic nerve may give evidence of increased intracranial pressure in choked disk in later stages of the disease especially with hydrocephalus. Intense engorgement of the retinal veins and of the optic disk is not an infrequent feature of the early phases of this infection. The third nerve may show irritation or paralysis, giving rise to the strabismus which is so common in the meningitic phase. The sixth nerve owing to its long and exposed course at the base of the brain is very likely to show symptoms of irritation or paralysis. The fifth nerve apparently escapes injury in this disease. The facial nerve is not infrequently affected especially in children, giving rise to facial spasm or paresis. Affection of the eighth nerve is common. The deafness which results is unfortunately in almost all cases permanent. The remaining cranial nerves are not seriously affected unless we mention the bradycardia which is the

probable result of increased vagus stimulation from the rise of intracranial pressure. Cheyne-Stokes' or Biot's breathing may also have a similar origin.

### COURSE

Few infections have a more variable course. Death may come with startling suddenness. Numerous instances of death four hours after onset have occurred. Abortive cases occur without the development of serious systemic or local symptoms. Typical cases may run their course for weeks. Relapses may occur so that the patient is afflicted for several months.

Factors in duration are the severity of the infection and the response to serotherapy. The prognosis in an individual case had best never be made. No one can give a satisfactory prediction of the outcome in a given case. Unfavorable features are great abruptness of onset with a high or subnormal temperature, great prostration, extensive hemorrhagic rash, polyarthritides or such complications as endocarditis, pericarditis, hydrocephalus, extensive cranial nerve involvement and particularly a lack of response to treatment with serum. Most important of all in prognosis is the promptness of diagnosis and treatment. If adequate amounts of suitable serum can be given within forty-eight hours of onset, the mortality should not be above 12 per cent. If the diagnosis is tardy and serum therapy deferred until later, the mortality tends to rise about 10 per cent for each twenty-four hours of delay.

Cases with a very low or a very high leucocyte count and with a very high percentage of polymorphonuclear cells are likely to do badly. Extensive purpura is a death warrant. Occasionally in grave cases the spinal fluid will show little or no cellular reaction but myriads of meningococci. Such are always fatal. Fortunately most cases that recover recover completely. A period of nervous and muscular asthenia, of intolerance of sunlight, of headache, may be observed. Rarely in children deaf mutism may result or chronic hydrocephalus with its mental and physical

symptoms. Blindness of central origin is likely to be transitory. When of peripheral origin it is permanent.

### TREATMENT

Treatment is one of the most important chapters in medicine. Every practicing physician should have a clear picture of the early features of this disease and a well planned course of action in the event of its recognition.

Of the general treatment of meningococcus infections little need be said. Quiet is essential. Strong light should be avoided. Pain should be relieved by ample doses of opiates. The specific treatment should be carried out promptly and thoroughly. In this disease half way measures are not to be tolerated. In the early phases of the infection each hour counts and delay may incline the balance between life and death. Among experienced clinicians there is little debate about methods of serum therapy. When the diagnosis has been made early in the stage of bacteremia, it is obvious that intravenous therapy is required. Intravenous therapy is also valuable in the early stages of the metastatic or meningeal stage. Its advantages are that one can give a large volume of antibody. An argument of the opponents of intravenous therapy is that it is unnecessary since serum given intraspinally finds its way into the blood stream. While this is a fact, a fact of greater importance is that the amount of serum that can be given by the intraspinal route is limited. Rarely more than 35 c.c. can be administered intraspinally. Experience has shown that intravenous therapy to be effective must be a massive therapy, the average adult requiring doses of 100 c.c. of serum. A more valid argument in opposition to intravenous therapy is that reactions occur and are sometimes serious. This is true of any intravenous serum treatment. Despite all precautions, grave and even fatal accidents may occur occasionally. The patient, however, is in less danger from serum reactions than he is from an inadequately treated meningococcus infection. The lesser danger lies in thorough treatment.

The outline of the treatment of an average case of men-

ingococcus infection may be given. If the diagnosis is made within four days of onset or if petechial hemorrhage or other evidence of systemic infection is present, the average adult should receive 100 c.c. of antimeningococcic serum in the vein. This should be repeated in from six to eight hours if the condition is serious; in twelve to twenty-four hours if the symptoms appear to be under control. Usually three intravenous treatments are adequate. These should be given with every possible precaution against anaphylaxis. Sensitization of the skin should be determined beforehand. An injection of a small amount of serum should be given under the skin. If the patient seems sensitive, desensitization by increasing amounts of serum should be carried out. When administering serum the first 15 c.c. should be introduced at the rate of one c.c. a minute, observing the patient carefully for palpitation, dyspnoea, urticaria, precordial distress, collapse or other evidence of sensitiveness to serum. If this point in the serum administration is passed without serious effect, the rest of the treatment may be given without delay. Further intravenous serum treatments are very unlikely to result in distressing symptoms. Daily intraspinal treatments should be begun as soon as the spinal fluid becomes cloudy. Under ordinary conditions diagnosis is not made until this occurs. In patients whose symptoms are relatively mild, intraspinal treatments alone will suffice. However, if there is evidence of toxemia and of a severe infection, in my opinion, intravenous treatment should be used despite tardy recognition of the disease. The average case requires four to six intraspinal treatments. Some will need as many as twenty.

Fundamental in serotherapy of this disease is the use of a serum containing the antibodies specific for the type of meningococcus concerned. It must be thoroughly recognized that serums vary in their antibody content and that the meningococcus is not a fixed species. In the treatment of every case, therefore, we must recognize two variable

factors; the organism and the serum. Excepting the therapeutic effect there is no satisfactory way in which the efficacy of a serum can be measured. Next to the result of its administration to the patient, the agglutinin content is most reliable as a test of therapeutic efficacy. To be effective therapeutically the serum should agglutinate the organism obtained from the patient's air passages, circulating blood, skin or meninges in at least 1 in 50; better 1 in 800 or 1200.

If the response to serum is not prompt and effective, if the improvement in the patient's condition is not striking one must immediately discard the serum used and obtain some from another source in the hope that this second serum will contain the necessary antibodies. This is a fundamental rule of which no practitioner should be unaware.

The cause of continued symptoms must be sought in a number of directions. An overwhelming type of infection may be present in which case death is not long delayed. Treatment may have been inadequate or the serum used may not be adapted to the type of infection concerned. Some complication may have arisen. Those to be looked for are pneumonia, pericarditis, endocarditis, arthritis, epididymitis, subarachnoid block, encephalitis, cerebral or cerebellar abscess. After the seventh day serum sickness must be regarded as a possible cause of persistent symptoms. It is often difficult to decide when to stop treatment. Such a decision is important because it is quite possible to overdo treatment.

In the later phases of the disease one may meet a condition in which there is a slight irregular fever with other persistent symptoms and in which each intraspinal treatment is followed by an increased meningeal irritation. At this point careful study of the spinal fluid should be made. If organisms cannot be found on smear or culture, if lymphocytes are 10 or more per cent of the cells present in the fluid and if the cell count is lessening, one is usually

safe in considering that the infection is under control. In this event all serotherapy should be omitted. The spinal fluid should be withdrawn daily or on alternate days for careful study. If polymorphonuclear cells increase in number and proportion, if organisms reappear or if symptoms of infection do not abate, intraspinal treatment may be renewed cautiously. Usually, however, it is best to let nature take its course and the patient will promptly get well if let alone. In the later stages of the meningococcus meningitis, a hypersecretion of fluid may be annoying. There is persistent meningeal irritation with headache. Lumbar puncture obtains a large amount of fluid under considerable pressure. The fluid is not likely to be very cloudy and contains comparatively few cells and no organisms. In a case of this kind one should not give serum but should drain by the lumbar route if such drainage is followed by relief. The outlook is usually good in this situation.

Treatment of other metastatic purulent foci as in arthritis, pericarditis, etc., is by the withdrawal of pus and the local injection of meningococcus serum.

Treatment of the mechanical accidents of the disease is most important. If unrelieved, they are fatal. Cistern puncture is of great value in spinal subarachnoid block as it makes drainage effective and serum administration possible. This measure is also of use in the not infrequent block at the foramina of Luschka and Magendie. If block has occurred higher up in the aqueduct of Sylvius or foramina of Monro, one must resort to ventricular puncture either through the fontanel in children or the corpus callosum in adults. One should not hesitate to establish this drainage. Serum may be administered into the ventricles at the same time. Radical surgical measures such as constant drainage are probably unwise. Recurrences are not infrequent, sometimes after an interval of several months. Necropsy studies have revealed that the typical exudate in the meninges is absorbed very slowly. This probably acts as a nidus of infection. To ward off recurrences it seems wise to give vaccines to the convalescent. One might sug-

gest one-half billion of killed meningococci subcutaneously at intervals of a week for three or four doses.

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## DIET IN DISEASE

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A few months ago I was asked to serve on a committee for revising the dietaries of a group of hospitals. We were faced with the limitations of a relatively small budget, a limited number of dietitians, and a large number of patients. The collection of special diets used in these different hospitals was quite formidable, but we found, somewhat to our surprise, that a great many of the indications could be met with a much smaller variety of diets. The urgent necessities of the situation focussed our attention on the fundamental principles underlying the prescriptions of diet in disease. With your permission, I shall treat this as a meeting of a somewhat larger committee whose chief purpose is to consider these principles. For purposes of discussion, we shall confine ourselves largely to hospital dietaries but everything that we say may be applied also to private practice. Some of you may be disappointed because I cannot tell you certain combinations of food that are ideal for certain diseases. I should like to be able to do this but it is difficult to predict how long any foods would be the proper ones. Fashions in diet change rapidly—fundamental principles remain valid for many decades.

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At the very start, we should consider the nature of the evidence and the strictness of the criteria that must be employed in making our judgments. Our customs regarding foods become fixed so rapidly and so firmly that it seems almost impossible to apply to them scientific methods. We are accustomed to three meals a day at certain recognized hours. The number of the meals and the hours are largely determined by chance, and, as every traveller knows, the number of meals and the hours vary widely in different civilized countries; even in the same country they have varied in succeeding generations. Primitive man probably got along very well with wide variations in his meal hours. Different races get along very well with enormous differences in food materials. Doctors who specialize in diabetes have been satisfied, at various times during the last two decades, with régimes that differ quite radically. Judging by our experience in diabetic and in infant feeding, we must recognize the fact that a diet universally accepted one year may be almost entirely abandoned in half a decade.

Where do we get our information regarding foods? A small portion of it comes directly from recognized authorities on nutrition—the largest portion of it from advertising agencies who have either broadcast this information accurately or in a form distorted to suit their purposes, or, indeed, they have made up their own misinformation in order to boost the sale of their products. I do not believe that the public has realized the cleverness of the modern food advertising agency. The men who write advertisements are very highly paid, they are extremely intelligent, and they have at their command every available source of information. They can spend months in the preparation of one short sentence which serves as a slogan, and in this they are encouraged by some of our greatest universities. There is no question regarding the efficiency of these advertisements, but as to their sincerity, we sometimes have grave doubts. If then the American public is to derive its information from advertisements, it is the bounden duty of the medical profession to employ

its powerful influence in directing this advertising. It was for this reason that about a year ago the Council on Pharmacy and Chemistry of the American Medical Association established a Committee on Foods. You are familiar with the work of the Council in its censoring with great care the advertisements of drugs and medicinal foods accepted for the book "New and Non-Official Remedies." The United States Government has accomplished a tremendous amount of good by establishing and maintaining standards with regard to foods and by insisting that the label shall contain an honest statement of the contents of a package. Unfortunately, the Government has not been able to control the advertising and some manufacturers have taken advantage of this freedom. Our Food Committee, therefore, has directed its attention almost exclusively to advertising. If a manufacturer wishes to have his food product accepted for an advertisement in the *Journal of the American Medical Association*, or in *Hygeia* and to have it included by the Committee in its forthcoming book on foods, he must submit a full statement of the composition of the food and its method of preparation, and must also present every scrap of his advertising. Claims are carefully examined by a referee and are then passed on by the Committee. The result is that foods with honest advertising are accepted promptly and are allowed to be stamped with the seal of the Food Committee. Promoters of foods heralded with nutritional or health claims that are doubted are requested to give proof of the veracity of their statements, or to alter the food, or the claims, to conform to the truth. Almost invariably the producers have complied with our requests and their products have been made acceptable to the Food Committee. Sometimes such an investigation has even necessitated a complete change in the name of a product. The Committee has tried to be broad-minded and lenient and has allowed certain statements such as "The most delicious food you have ever tasted." This epithet is harmless because it is so generally applied, and it probably does make the food taste better. On the other hand, the state-

ment "An ideal food" has been rigorously excluded, and all claims to high nutritive value or a high vitamin content have been held up until proper proof could be furnished. Claims of usefulness in particular diseases have undergone the most careful scrutiny. The Committee has probably made a good many minor mistakes, but the result is that you can believe the statements made in the food advertisements of the *Journal of the American Medical Association*, or in any of the advertising matter that bears the seal of the Committee.

Now if this can be done in the case of individual foods, why cannot we here at this meeting use the same standards for various diets employed in disease? I have already mentioned the fact that innumerable diets are used in different diseases. If you look on stack S 21 of the Academy Library you will find about fifty feet of shelf room devoted to books on diet. A few inches of space suffice to contain the books that deal with the general principles, while many feet are required to hold the lists of foods supposed to benefit certain maladies. How the authors make their fine distinctions remains a mystery. One firm advertises a hundred different lists designed to accommodate any disease known to man. Another book, and not a bad book at that, lists all sorts of diets. For example, on page 194 is found "Nutritious diet (for adult male stock broker under nerve strain)." Page 86, "Gastritis, chronic, alcoholic (travelling man)." Page 81, "Fattening diet (for frail young mother)." And the next diet, also a fattening diet, is intended for "Spinster with impaired digestion." I searched for the difference between the diet for the spinster and the frail young mother and found that they were identical except that the young mother is given, on retiring, "a glass of milk, three or four lady fingers, or bread and butter." Undoubtedly the most popular diet in the book is to be found on page 207, under "Obesity." "The object of this diet is to retain the figure of youth in an unoccupied woman past forty."

Let us consider critically certain factors that go to make

up a diet. First, we have the caloric content. How closely can we estimate this? Should we say that a given patient needs enough calories to cover his basal metabolism plus 5-10 per cent for the specific dynamic action of his food plus 20-100 per cent for his bodily activity? There is a great deal of guessing called for, and it is only the man who guesses well who will come any where near the correct answer. The estimation of the basal metabolism contains an error of 10 or 20 per cent, but this is dwarfed by the estimation of the allowance for bodily activity. There are large individual variations. In general, the figures given in the text-books for people of various sedentary occupations would probably apply to most of our ambulatory patients as satisfactorily as calculations built up from the basal. The question next arises as to the smallest differences in caloric values that can be appreciated by the patient's metabolism. I doubt if a change of less than 10 per cent is perceptible except in a very delicately balanced metabolism experiment. A patient receiving say 2,000 calories would probably not react to changes much smaller than 200 calories. In other words, if we were planning a diet we could make a jump from 2,000 to 2,200 without bothering about the intermediate steps. I heard the other day of a man who wrote a book on dietetics making his increases five calories at a jump. This reminds one of the little boy who asked if it would harm the elephant if he gave him a currant from his bun.

I do not see any reason why we should not make jumps of 10 or even 20 per cent in our protein ration. For amounts of protein of over 70 grams a day it is doubtful if increases of less than 20 grams at a step are perceptible in their effects. If, in our metabolism ward, we have a patient in very delicate nitrogen balance on a low protein intake and follow him for months at a time we can discern a few minor changes in his metabolism caused by changing his protein intake 10 grams a day. Just what the optimum protein intake is for any special disease remains very much in doubt. There is no point in restricting the protein intake below 30 grams a day even in the most severe

nephritis, because if the patient doesn't get this protein from his food he will get it from his body, and the effect on the metabolism and excretory organs will be just the same. There are some indications in nephritis with nitrogen retention, and in severe diabetes, for keeping the protein intake between 30 and 50 grams for a restricted period of time. For most diseases we do not really know where to set the protein intake, except that it probably should be somewhere between 50 and 150 grams a day. For growing children and for convalescents, and perhaps for certain patients with nephrosis, intakes higher than 120 grams may be indicated. We, probably, have been too much afraid of protein food and it is certain that a good many people tolerate liberal protein rations surprisingly well.

It is doubtful if our steps in the carbohydrate ration need ever be smaller than 10 grams at a time. Perhaps in a very carefully balanced diabetic patient observed in the metabolism ward with extreme care we can see some metabolic effect from the addition or subtraction of 10 grams of carbohydrate, but in the ordinary patient about 20 grams must be added before the effect is apparent. I wish we knew the minimum carbohydrate intake that is compatible with perfect health. Joslin and some of the other workers in diabetes are much concerned with the possible danger of producing arteriosclerosis by giving, for long periods, diets that contain less than 100 grams of carbohydrate a day. This may be important, but I am not acquainted with any adequate proof of the contention. We must remember that there are tribes of Esquimos that live long and contented lives on a meat diet with a total carbohydrate intake of 30 or 40 grams a day. There is no evidence that they suffer from arteriosclerosis or kidney disease any more than the rest of us. Certain it is that arteriosclerosis is common and of major significance among the poor of our city whose diet is particularly high in carbohydrate. I am rather surprised that no one has advanced the argument that a high carbohydrate diet predisposes to arteriosclerosis.

When it comes to fat, this substance is so inert and so easily deposited in the body, or lost from the body, that we have been able, in our metabolism experiments, to change the fat intake 100 or even 200 grams at a jump without any perceptible change in the metabolism. Of course, an excess of fat long continued may lead to a higher fat metabolism and eventually obesity, while a deficit if not supplied by calories from other sources will result in undernutrition. My point, however, is that the human body can store large amounts of fat and expend them when necessary. We may use as an example the water supply of a modern city like New York. The city's consumption of water is not increased after each heavy rain, nor is it diminished in periods of drought until the reservoirs are seriously depleted. All of which leads us to the conclusion that there is no need of fussing about small changes in the patient's dietary.

The question of the mineral salts in our dietary has recently assumed a good deal of importance. Sodium chloride has been blamed, not only for the production of edema in cardiac and renal diseases, but has also been accused of contributing materially to hypertension. At first, attention was focussed almost exclusively on the chlorine portion of the sodium chloride molecule, and a diet low in table salt is often referred to as "a chloride poor diet." This has fixed in the minds of the medical public dangers attributed to chlorine. More recently, biologists and physiologists have been putting the blame on the sodium content of table salt, and it must be confessed that their evidence is fairly strong. Clinicians on the whole have been rather disappointed by the effects of salt reduction on the edema of cardiac and renal disease. Occasionally withdrawal of salt relieves an edema, but much more striking effects are often obtained with calcium chloride, especially if supplemented by salyrgan. It is, however, necessary to issue a note of warning, because the general condition of a patient does not necessarily improve in proportion to the disappearance of the edema.

The question of the rôle of table salt in the causation of hypertension is still unsettled. Allen is quite emphatic that hypertensive patients are benefitted by salt reduction, and he ascribes the failures of others to the fact that their diets have not been strict enough and have not been continued for sufficiently long periods. In Germany, a salt poor diet in tuberculosis has been urged as a method of decreasing the water content of the tissues and as an aid to calcification. Salt withdrawal is a part of the Gerson-Hermannsdorfer-Sauerbruch régime. There has been a large amount of clinical observation on this subject but most of it has been rather loosely controlled and the question is not yet settled.

From the fruit-growing state of California comes an appeal for an alkaline ash diet as a cure for hypertension and many of the other ills of life. Most of us are getting along with urine that is distinctly acid on account of the preponderance of cereals and meat in our diet. If we would only change to a diet with little meat and cereal and a large proportion of beans and citrous fruits we would have alkaline urine. Oranges, lemons and grapefruit may taste acid but the citric acid is burned, leaving the basic salts to neutralize other acids in our bodies. From Germany, however, comes a plea for an acidification of the diet if we wish to cure tuberculosis. There is a great deal of talk but very little evidence. At the present time we should be careful not to be carried away by propaganda.

Calcium is deservedly coming in for a great deal of attention. Sherman has shown that the American diet is dangerously near the minimal calcium intake theoretically compatible with health. The discovery of parathormone and viosterol has given us means of modifying the calcium metabolism. In certain definite diseases of calcium metabolism the clinical results have been striking. These two products sometimes need to be supplemented by a diet rich in calcium and for this indication milk has shown its value. Calcium lactate is being used extensively and good results



have been obtained with calcium gluconate. When it comes to the question of the diet for diseases not definitely associated with the disturbance of the calcium metabolism, we are still without evidence as to the optimal calcium intake.

This naturally brings us to a discussion of the vitamins. There is no question at all as to the value of the vitamins in cases of well-established vitamin deficiencies. In patients who have definite symptoms of these deficiencies, the results of feeding the proper vitamin are almost miraculous. Here, in New York, frank cases of vitamin deficiency are comparatively rare. Even at Bellevue Hospital where we treat the poorest classes of the city, and care for many sailors, many foreigners ill-adapted to our New York life, many down-and-outers who are either densely ignorant or mentally subnormal, and many chronic alcoholics, we have relatively few clear-cut cases. I, myself, have never seen xerophthalmia, or beri-beri. We often go months without finding an adult case of scurvy. Osteomalacia is extremely rare. Pellagra in its more severe manifestations is uncommon, in New York, but we do observe among chronic alcoholics quite a few men with the milder symptoms. These patients usually give a history of having subsisted for many weeks on a diet of coffee and doughnuts.

What about the effects of vitamins in patients who do not show the frank symptoms of deficiency? Should we deliberately strive in the case of healthy persons and with most of our patients to provide a diet containing a much larger amount of vitamins than has been the custom here in New York? It is very hard to obtain direct evidence on this point. The poor of this city probably take in their diets a small fraction of the amount of vitamins consumed by the rich. They seem to be somewhat more susceptible to disease, but not markedly so, and it is only when we get down to the lowest levels of poverty, shiftlessness, alcoholic indulgence, and exposure that we find a sharp increase in the mortality in such diseases as lobar pneumonia and tuberculosis. We must remember, however, that many factors besides vitamins affect this situation.

The Mellanbys believe that there are substances in some foods, such as oatmeal, that act in a manner opposed to the vitamins, and they believe also that an excess of vitamins will increase resistance to infection and prevent decay of the teeth. There is a good deal of evidence that a diet rich in a variety of vitamins, particularly A, C, and D, will increase resistance to tuberculosis and help in the prevention or cure of intestinal lesions of this disease. There are many reports indicating augmented protection against minor infections. The widespread popular movement towards a more liberal vitamin ration is most cheerfully aided and abetted by the manufacturers of every foodstuff containing more than a trace of vitamin. Probably we should allow ourselves to be carried a moderate distance by this wave of popularity. A diet high in vitamins is apt to taste good, seems to improve the appetite, and usually carries with it an increase in the mineral salts. There is only small evidence that such a diet can do harm. Very large doses of vitamin D, as contained in high-potency viosterol, are dangerous, and it is quite possible that any large amounts of one vitamin unbalanced by others may produce untoward effects.

When it comes to the practical administration of the vitamins, we must remember that they vary greatly in their responses to cooking, drying, and storage. Vitamin A, the fat-soluble vitamin which cures xerophthalmia and aids in growth, is fairly stable to heat and is only slightly affected by cooking or by canning, if air is excluded in the process. Vitamin D is very resistant, as is vitamin B<sub>2</sub>, sometimes called vitamin G, the one that is associated with the prevention and cure of pellagra. Vitamin B<sub>1</sub>, sometimes called F, or the antineuritic vitamin, is partially destroyed by heating to a high temperature in the presence of alkali; vitamin C, the antiscorbutic vitamin, is rapidly destroyed by cooking in an alkaline or even in a neutral solution, and is also susceptible to drying or aging. Fortunately, one of the best sources of this vitamin, tomato juice, is not spoiled by careful cooking, or canning, because it is acid.

There has been a widespread prejudice in this country against canned vegetables, and a great many people still believe that the so-called "fresh vegetables" cooked in the home contain more vitamins than canned foods. This is probably not the case, as the home-cooking of vegetables, or fruits, in an open vessel is an excellent method of oxidizing the vitamins, particularly if cooking soda is added to preserve the green color and improve the flavor. Most of the canners are now taking every precaution to avoid the oxidation of the vitamins. Fruits and vegetables are prepared when they are very fresh, and if they are to be puréed they are hashed in an atmosphere from which oxygen has been excluded and cooked in one that is practically oxygen-free. In all products submitted to the Committee on Foods, tests on animals are made which show as quantitatively as is possible at the present day the content of the vitamins.

The importance of roughage in the diet has been the subject of a good deal of controversy. In Germany, there has been great enthusiasm for a raw diet which is high in vitamin content and high also in indigestible residue. Some of the reports say that it is borne surprisingly well, but most of the German physicians seem to look on it with mild amusement. Again, in California, there is some tendency toward a diet with a very bulky residue. Alvarez, of the Mayo Clinic, believes that an excessive amount of roughage can do a great deal of harm, and has obtained with a bland non-residue diet results that would delight the strongest advocate of bulky residues. Bran has had a tremendous vogue among the laity, encouraged by the advertising of manufacturers of bran products. Recently, I canvassed the best gastroenterologists that I know for their opinions and found that none of them advised the use of bran, although they did not seem to think that small amounts were particularly harmful. The excessive quantities of bran and other roughage consumed by some individuals with a frantic desire to cure constipation may do a great deal of damage. Man was not given the digestive system of the ox.

We have just reviewed a large number of debatable points in the dietary of disease. How can we secure reliable evidence as to whether or not a certain diet is of benefit? Clinical impression is the popular answer, and it would seem fairly satisfactory were it not for the fact that clinical impression, in past decades, has strongly backed about one thousand drugs or diets now discarded, for every dozen drugs or diets now employed. There is no good reason why a diet that is worth while should not give results that are definite enough to become apparent when treated in a perfectly scientific manner and subjected to analysis. Suppose, for example, we wish to prove that a certain diet in lobar pneumonia is better than the conventional one used in this disease. The first thing to do would be to assign alternately our pneumonia cases to two groups, one receiving the new diet, the other, the old. Care would have to be exercised in order that each group should contain approximately the same proportion of pneumonias of the severer types, etc. Judging from my past experiences in testing serum and digitalis in lobar pneumonia, I should say that we would probably have to collect at least four hundred cases on the new and four hundred on the old before we could say definitely that the new diet produced a lower mortality than its predecessor. If the results were very striking and one group showed a mortality of 40 per cent, while the other group showed a mortality of 30 per cent, we could perhaps obtain our answer before we had studied 800 cases. Of course, a much smaller number of cases carefully studied would give us information regarding the effect on abdominal distention, nitrogen balance, etc. In the case of typhoid fever, Coleman was able to establish the beneficial effects of his diet fairly definitely by an analysis of 111 cases on a high calory diet, as opposed to about 773 controls on a previous low calory régime. I had the good fortune to be associated with Dr. Coleman in part of this work, and I know the careful studies that supported the relatively small number of cases from which the final conclusions were drawn. Shaffer and Coleman spent several years in a study of the nitrogen balances. I, myself,

spent about two years in a study of the absorption of the food in his cases. Dr. Coleman and I studied the caloric requirements and the effects of food on metabolism, first, for two years with a small respiration apparatus, and then for two more years, in a respiration calorimeter. Torrey made an extensive investigation of the bacterial flora. Finally, the experiences of many other clinics confirmed Coleman's conclusion. None of this work was wasted—it was all necessary to prove the point.

Let us contrast with this prolonged study the methods that have been used in forwarding the Gerson-Hermannsdorfer-Sauerbruch diet in tuberculosis. This diet, first devised by Gerson, is high in vitamins, sodium chloride is excluded as much as possible, and a mixture called mineralogen is included, consisting of a dozen salts, the main constituents being calcium phosphate and calcium lactate, supplemented by other compounds, one of which is a substitute for salt, the other probably contains cod liver oil and phosphorus. This diet has been given to a large number of tuberculosis patients; some clinicians are very enthusiastic about its effects in lupus, and others say that it is of great help in bone tuberculosis and in the healing of wounds. In certain quarters its results in pulmonary tuberculosis are highly praised, but a good many writers insist that this régime possesses no advantage over the customary diet which contains liberal amounts of vitamins. What would be required to put this régime to a really scientific test? I believe that it would be necessary to select two hundred patients with tuberculosis, and, as controls, an equal number with approximately the same localization and severity of infection. These two groups should be followed for one or two years before drawing any conclusions. If by that time the régime showed a significant advance in therapy, it would be essential to test out the various factors, one at a time, in order to know whether it was a high vitamin content, or a low sodium chloride, or a complicated mixture of salts that was responsible for the improvement.

I suppose it is too much to hope that diets for diabetes will be tested in this manner. In the last eighteen years I have watched many diabetic diets come and go and each time that a new one has become fairly well-established I have wondered how long it would last. During this period, we have had the Naunyn diet, the Allen treatment, the Shaffer-Woodyatt balanced diet, the Newburgh and Marsh high-fat diet, the insulin régime with increasing carbohydrate, and now we have reached an era when the carbohydrate is being raised still higher in our effort to make the patient happier and to prevent the possible development of arteriosclerosis. There is much to be said in favor of giving liberal amounts of carbohydrate if the insulin is carefully regulated, but this diet is not an easy one for the doctor, and its use requires a great deal of skill. In fact, every diabetic diet requires skill and a fairly extensive knowledge of the fundamental principles of metabolism. I think we should remember that the basis of an excessively high carbohydrate diet for patients who require insulin is largely theoretical, and that it is going to be many years before statistics will show whether or not we have diminished the incidence and severity of arteriosclerosis by this treatment. Personally, I am more inclined towards a moderate carbohydrate intake and smaller doses of insulin. Still, there are a great many things that we do not know about carbohydrate metabolism. There is a good deal to show that if the carbohydrate intake is restricted too much the patient loses tolerance, and that carefully adjusted increases in the carbohydrate ration may lead to an increased ability to oxidize this food-stuff. For many years we strove to protect this oxidative function by keeping the demands upon it as low as possible. Now we strive to exercise it judiciously but in our enthusiasm for the new method we must be careful not to overstrain this function. Experience has shown that when a diabetic indulges in carbohydrate excesses he pays the penalty with diminished tolerance and perhaps even with coma.

I wish that it were in my power to state exactly the

best diet to be used in obesity. All we know is that if you want to reduce the weight of a patient you must see that the caloric intake is distinctly less than the caloric output. If this is kept up for over a month and the patient does not happen to develop an edema, there is no way that he can escape losing weight unless he finds some supernatural means of violating the law of conservation of energy. It is curious how many doctors adopt theories regarding obesity that violate this fundamental law, when their sole evidence against it consists in statements from their patients to the effect that they are not large eaters. Newburgh and Johnston have recently published reports of careful studies which show that obese patients who are carefully watched and given sub-maintenance diets always lose weight, although such loss may be masked for one or two weeks by a retention of water in the body. This finding is by no means new, but these workers have demonstrated it most convincingly. They have emphasized the old belief that obesity is caused by too much food in relation to the expenditure of energy and they disregard the various complicated classifications of obesity that have confused our literature. All clinicians agree that there is a form due to over-eating, but they also set apart groups of patients in which the trouble is supposed to lie in one or more of the ductless glands. It is in these groups that they seek for supernatural mechanisms. It may be true that in a given patient with hypothyroidism, or dyspituitarism, the basal metabolism may be lower than normal and there may perhaps even be a greater economy in the digestion of food and the performance of muscular tasks. In such a patient the total expenditure may be low, but if the intake is still lower a loss of weight is inevitable. There has been an extensive search for the mysterious factors that border on the supernatural. A good many European and some American investigators have reported that the specific dynamic action of foods is reduced in obesity. McClellan and Spencer, in our laboratory, and a good many workers in other laboratories have been unable to confirm this fact. I do not think that any significant abnormality

has been found in the metabolism in obesity except an increased ability to metabolize fat without ketosis. Obese patients have an unusual tolerance for a low carbohydrate diet. Although they tolerate a low carbohydrate diet this does not necessarily mean that such a diet is indicated. In our reducing diets we should provide enough protein to maintain a patient in nitrogen equilibrium, which can probably be accomplished by almost any amount over 60 grams a day. I do not know of any convincing evidence as to whether we should provide the remaining calories chiefly in fat or chiefly in carbohydrate, so perhaps it is just as well to leave this to the individual doctor who will quickly enough form a strong prejudice for one or the other.

It is impossible in this brief talk to mention more than a few of the diets used in the clinic. There is, however, one point of fundamental importance that I should like to emphasize and that is the time factor. If a diet is planned for a long period, it is essential that it should contain all the calories and individual elements necessary for adequate nutrition, unless we are deliberately attempting to reduce weight by restricting calories. If a diet is to be used for only a few weeks, as, for example, the strict Sippy diet in peptic ulcer, we can relax our vigilance regarding the various constituents, even some of the vitamins. Healthy men can starve for a month if given plenty of water. Patients with fever and toxemia do not tolerate starvation nearly as well, but, nevertheless, they can draw on their bodies for many pounds of fat and of protein and for considerable amounts of calcium and other salts. A man who has been well fed can begin his starvation with a reservoir of about a pound of carbohydrate and several liters of water. Now these reservoirs are relatively small and they are the ones on which the clinician should concentrate his attention.

In a short and stormy illness where complete loss of appetite, or nausea, has limited the food intake, we do not need to worry much about the protein and the fat but we



must remember that it only takes two or three days to exhaust almost completely the small glycogen stores of the body and also the small reservoirs of water. Acute illness is usually accompanied by high metabolism which uses up carbohydrate rapidly. Fever and high metabolism lead to excessive losses of water through skin and lungs. If at the same time the fluid intake is diminished there will be a serious dehydration of the tissues, especially if there has been vomiting, diarrhea, or diuresis. I do not think it is too much to say that the dietetic error that has killed more patients than any other is the neglect of administering enough water. If water cannot be given by mouth, it must be given by rectum, by vein, or by the subcutaneous method. The practitioner should remember two things, first, that patients lose more than 600 grams of water a day through skin and lungs, and, second, that most people ingest about half of their water in the form of their so-called "solid foods," particularly such foods as lettuce, tomatoes, fruits, potatoes, etc. When these solid foods are cut off in disease it is necessary to supply a proportional increase in the liquid foods in order to bring the water intake up to the level of that of the ordinary man in health. In acute disease, we should make a still further increase in order to compensate for the excessive loss of water through skin and lungs. I beg the practitioner who is taking care of a patient severely ill to watch the urine and see that it does not become too concentrated. A high colored urine is a reproach to the doctor and to the nurse. A dehydrated skin and tongue are danger signals.

When you try to feed patients who are acutely ill, the limiting factor is usually lack of appetite. How I have longed for some hormone that would bring the appetite just to the desired level, so that the patient would take gladly the food that is offered to him. We should not be too placid in our acceptance of this lack of appetite. Often when a nurse has told me that a new patient, say with typhoid fever, has no appetite, I have found the tongue dry and cracked and the teeth covered with sordes. How could any man have an appetite with a mouth of that sort?

Why is his mouth in that condition? Often it is dry because he is breathing through it, and he is breathing through it because his nose is stopped with dried mucus. Therefore, if you want to combat in a typhoid patient the phenomena of a low respiratory quotient, ketosis, negative nitrogen balance, etc., you should start with the simple operation of clearing out the nose so that the patient can breathe through it. You should next clean his mouth as rapidly as it can be done without undue trauma. You should then bring back the appetite by forcing food until the patient gets sufficient strength to have some appetite of his own. In the course of a few days you will often be surprised to find that a patient in the midst of his typhoid fever, will have teeth and tongue as clear as your own.

If we only had the proper hormones to control appetite how easy would be our task. We could bring the under-nourished man up to the ideal weight; we could give the diabetic the proper combination so that he would not desire to steal sweets; we could give the glutton an anti-hormone so that he would no longer want to eat too much. Let us look forward to the day when we can turn to the office nurse and say, "Give this patient a 1500-calory appetite."

In conclusion, I would like to speculate on the possibilities of dieto-therapy. Many enthusiasts believe that proper diets will cure practically all our ills, except a few that require surgery. I hate to be pessimistic but I cannot believe that diet will ever become of very much more importance than it is at the present time. The enthusiast points to the recent advances made through diet in the treatment of diseases of vitamin deficiencies and of pernicious anemia. Far be it from me to belittle the importance of these discoveries, but are they really dietary? The biochemists, with the aid of the large drug houses, have taken these food-stuffs and concentrated them until the active principles are now contained in pills. Shall we call liver extract a drug or a food? No one at the present time

considers thyroid extract a food, but a man who called himself a "dieto-therapeutist" might administer to his myxedema patient a hash containing thyroid extract; he could treat his patients having constipation with a stew made of senna leaves and figs, and malaria with a bitter tea made from cinchona bark. So, after all, it does not make much difference what we call these various agents, as long as we recognize their true natures and utilize them intelligently.

Not only must we recognize the true natures of the agents but we must also recognize their limitations. We must scrutinize with care all of our evidence. We must differentiate clearly between traditions founded on impressions and facts based on scientific observations. In each individual patient we must visualize the various metabolic processes and must direct our therapeusis to meet these specific indications.

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## COMMITTEE ON PUBLIC HEALTH RELATIONS

ADDRESS, E. H. L. CORWIN

Address of Dr. E. H. L. Corwin at the dinner given in his honor by The New York Academy of Medicine on the evening of May 6, 1931, to commemorate his twentieth anniversary of service with the Academy.

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While I know better than anyone else in this assembly that what has been said about me this evening is very generous, I may as well throw away false modesty and frankly own that it has given me infinite pleasure—for we are so constituted that we like to be praised at times, and we are thereby stimulated to greater endeavors—particularly when praise comes from such men as Dr. Hartwell, Dr. Dana, and Dr. Miller, under whose wise guidance it has been my privilege to serve the Academy. I cannot help but be proud that amidst the many and varied interests and obligations which all of you here assembled have, you have chosen to come here this evening to do me the honor, at this first historical occasion of mine.

When one begins to have historical events like this one, marking decades of service—when one has taken the first step to the emeritus rank, one is bound to indulge in reflections of a serious character, particularly when one has “history” as a mild avocation, as happens to be the case with me. I often reflect as to what it is that has always attracted me to the past. It is, I suppose, my attachment to humanity, my interest in the struggles of mankind, and in the glory of man’s achievement in the face of his limitations. Then, in retrospect, the characters of the drama of history are, in the words of Preedy, often “gorgeous ghosts; they enact their parts splendidly, their passions are romantic, their actions seldom lack the heroic outline; since they

died their persons have taken on a richer beauty, their characters a nobler cast; they are grander than when they lived; so much may we allow them in recompense for the dust that covers their memories." As the deeds that I will relate tonight do not lie that far in the glamor of the distant past, I will open my tale with a reference to real antiquity.

It was two thousand and three hundred years ago that on a sultry summer day, three men sauntered on the road from Cnossus to the cavern and temple of Jupiter. As was suited to their age, they rested frequently in the shade of the lofty trees of the road, as they discussed the origin of the State, the forms of government, and the bases of law. The three men were Clinias, of Crete, the host; Megillus of Lacedæmon, and Plato of Athens, his guests. The penetrating wisdom and worldliness of this symposium, known as "The Laws" of Plato, make it the greatest political treatise of history. I will quote but one bit from this conversation:

*Athenian*: "I was about to say, that no man is ever a legislator; but that fortune and all kinds of accidents, happening in all kinds of ways, are our legislators. For either a war by violence has overturned polities and changed laws, or the want of means arising from severe poverty. Many innovations, too, diseases compel men to make, through pestilences falling upon them, and unfavourable seasons during many years. He then, who foresees all this, will be eager to exclaim, as I just now did, that no mortal was ever a legislator, but that nearly all human affairs are accidents; and that it is possible for him, who asserts all this respecting navigation, and the arts of the pilot, and physician, and general, to appear to speak correctly. But on the other hand, it is equally possible for the person (to appear) to speak correctly on these points, who says this."

*Clinias*: "What?"

*Athenian*: "That a god, and, together with a god, fortune and opportunity govern all human affairs; but that it

is necessary to admit that art, a somewhat milder power, follows them. For on the occasion of a storm I should consider it a thing of great moment for the pilot's art to take a part, or not."

*Accident and opportunity!* They are often, indeed, determining factors in human affairs, individual and corporate. I shall no more than mention the *accidental* determination of my own life's work, and will proceed to present to you, very briefly, the results of the vision the men of the Public Health Relations Committee had, to use an *opportunity* to make the New York Academy of Medicine a vital force and a tower of strength within the gates of our City, and an object of emulation without.

I remember very distinctly the first meeting of the Committee which took place one evening in May, 1911, at the City Club. There were present: Dr. Dana, Dr. Miller, Dr. John Winters Brannan, Dr. Robert J. Carlisle, Dr. S. S. Goldwater, and Dr. Linsly R. Williams, and the following nine who are no more with us: Dr. Hermann M. Biggs, Dr. Algernon T. Bristow, Dr. Arpad G. Gerster, Dr. L. Emmett Holt, Dr. John H. Huddleston, Dr. Abraham Jacobi, Dr. Theodore C. Janeway, Dr. Samuel Lloyd, and Dr. W. Gilman Thompson. After the preliminary half hour of inchoate discussion, a subcommittee on plan and scope was appointed. This subcommittee, under the chairmanship of Dr. Miller, drew up a brief but statesmanlike report which became our charter.

The work began in a classical way. We were to study the incidence of epidemic diseases and the organization and administration of the contagious disease hospitals of the City. The available data of morbidity and mortality from zymotic diseases since the consolidation of the Greater City, showed the, by now well established, periodicity of certain of the diseases and brought out the fact that diphtheria has been an endemic rather than an epidemic disease. The study of the hospitals revealed the very striking shortcomings of these institutions at that time and the

shockingly high rate of cross infections. This marked a beginning of a slow process of improvements in these hospitals which came to full fruition a few years ago in the entire re-organization of the system, when Dr. Wynne was the Director of the Division of Hospitals in the Health Department, and the late Dr. Arthur W. Bingham was President of the Medical Board of Willard Parker Hospital.

The data gathered in this investigation were discussed by the newly-appointed Executive Committee which met every week. To my distress, it has been meeting every Monday afternoon ever since!

After a very short time of its existence, the Committee not only dispelled such apprehensions as the Trustees and Council of the Academy might have had as to the possible rashness of its decisions and pronouncements, but was able to secure from the Council and Trustees a Magna Carta of complete autonomy. In order not to hamper the Committee in its work the Council amended the by-laws of the Academy, which amendment was subsequently ratified on two occasions by the vote of the whole Academy, by which the Committee, in matters of public health and hospitals, might speak in the name of the Academy when a given action is adopted by a three-fourths vote of its membership, and the President of the Academy concurs. This was a very important and helpful provision, and to oil the machinery still further, we always had the President of the Academy as a member of the Committee *ex officio*. I may add that every one of them was an apt pupil: Dr. William M. Polk, Dr. Walter B. James, Dr. George David Stewart, Dr. Samuel A. Brown, Dr. Samuel W. Lambert, and Dr. John A. Hartwell. The last three presidents, prior to their election to the office, had the benefit of a preliminary service on the Committee. I wonder whether the precedent has not by now been firmly established. And yet we claim that we have nothing to do with politics! We must own, however, that at times we have employed the arts of diplomacy, although never its wiles.

Whenever one deals with "relations," whether congenital or acquired, diplomacy is indispensable, and we have been a Committee on Relations—Public Health Relations!

Our achievements, whatever they be, have been due, however, to more than diplomacy and tact. They have been due to the fact that the men on the Committee have been practical idealists, earnest in their solicitude for the welfare of our common life, imbued with the lofty traditions of their profession, and ready at all times to study minutely each matter on which they were to act or about which they were to express an opinion. The Committee was most fortunate in having had for its pilots men of such keen intellect, civic spirit, and high professional and cultural ideals as Dr. Dana and Dr. Miller. To have been associated with such men has been a privilege and inspiration of which I am acutely aware. Nothing has given me greater satisfaction than the fact that I have gained their friendship and appreciation.

Our work has been so diversified and has touched on so many domains of our civic, scientific, and educational life, that I have come, on account of it, into contact with men and women of all walks in life, who are the leading citizens of our community and of the nation. Many of them are here tonight, and I take this occasion to thank them and all others for their highly-prized friendship, and for their ever-ready helpfulness in our work. I also wish to express my gratitude to the many Fellows of the Academy who have responded cheerfully to every request which we have made of them for service. Several hundreds of the Fellows of the Academy have, during the course of the past two decades, served on our various subcommittees, and have given us the benefit of their judgment and their specialized knowledge. The strength of our position lies in the readiness of the entire Fellowship to serve for the benefit of our commonwealth and for the greater glory of the Academy.

Following the traditions of the original Academy of Plato, and of all the great academies of the world, our



Academy is primarily a deliberative, and not an executive body. But we have been able, however, as a result of our deliberations and surveys, to initiate a number of executive organizations, to stimulate new activities, and to influence the course of many already established.

As early as 1912, an Association of Out Patient Clinics of the City of New York came into existence, thanks to our initiative. The Committees of this Association formulated the first existing standards of dispensary organization and administration, and these were subsequently adopted by the American Hospital Association and by other national bodies. Following our survey of dispensary performance, the Rockefeller Foundation set up a Committee on Dispensary Development to stimulate the practical adoption of these standards. The Associated Out Patient Clinics continues its useful existence as a part of the New York Tuberculosis and Health Association, under the guidance of Dr. Alexander Lambert.

In 1915, we inspired the formation of a Health Federation in New York City which did useful work in the City, under the chairmanship of Dr. Livingston Farrand, until our entrance into war.

Jointly with the Bureau of Municipal Research, we organized the first practical six-week course in Public Health Administration, which was attended by fifty-five health officials from many parts of the country.

Our study of the *Hospital Situation in Greater New York* was admittedly a model for future surveys in other cities. Following the publication of it, the Hospital Information and Service Bureau came into existence as a result of a morganatic marriage of the Academy with the United Hospital Fund. This Bureau has functioned as a very useful institution in this City, under the chairmanship of Dr. George David Stewart.

The Public Health Relations Committee formulated standards for convalescent care which, like those of out

patient work, constitute the first attempt at formulation of principles in this important, but hitherto neglected branch of our armamentarium in the treatment of the sick. This work is developing very rapidly under the chairmanship of Dr. Adrian Lambert.

Following our study of child health, the Laura Spelman Rockefeller Memorial Fund set up an Institute for Child Study in connection with Teachers' College.

Our inquiry into conditions surrounding the supply of blood donors for transfusions led to the organization and incorporation of the Blood Transfusion Betterment Association, which functions very effectively under the presidency of Dr. John A. Hartwell, and under the scientific guidance of Dr. Karl Landsteiner.

Our dental school survey of many years ago prepared the way for the re-organization of the then proprietary schools as university departments of dentistry.

Outdoor cleanliness contributes to health and to civic pride. We have brought about the organization of the Committee of Twenty on Outdoor Cleanliness, on which many civic agencies are represented, and which, with the aid of sanitary experts like Dr. George Soper and Mr. Thomas J. Duffield, carries on very good work under the vigorous chairmanship of our Dr. Bernard Sachs.

Under the chairmanship of Dr. Conrad Berens, we have recently completed a most painstaking survey of air pollution, and we are hopeful that in the near future the smoke, soot, and vapor pall hanging over our City will be dispelled, and that we will reclaim the full quota of our ultra-violet radiation for which our City was renowned in the pre-prohibition days. Somehow or other, everything has gone wrong since the advent of this era.

We are now in the course of conducting a most searching quest into conditions of obstetrical practice in this City. This study, conducted by Dr. Ransom Hooker, with the aid of a group of eminent obstetricians, and under the direc-

tion of a subcommittee of which Dr. Sondern is chairman, bids fair to result in a better understanding of existing conditions than has ever been arrived at elsewhere, and will, no doubt, lead to some effective measures of control.

We have brought about the organization of the National Conference on Nomenclature which, thanks to the indefatigable industry and the remarkable ingenuity of Dr. George Baehr, the Chairman of the Executive Committee, and Dr. H. Burton Logie, its Executive Secretary, has accomplished what seemed to be an impossible task.

We have repeatedly stressed the importance of the proper care of the sufferers from chronic ailments. Recently, prompted by the appreciation of the need for service in this neglected field of therapeutic endeavor, we made a study, under the chairmanship of Dr. Malcolm Goodridge, of the principles and management of spa treatment in France and in other countries. On the basis of this report, and thanks to the persuasive efforts of Mr. Bernard M. Baruch, the New York State Legislature voted one million dollars last year, and another million this year, for the proper development of Saratoga Springs.

Although we do not maintain a lobby at Albany, we pester the legislators at each session with many missives sent by wire or by post. Professor Joseph P. Chamberlain, the head of the Law Drafting Bureau of Columbia University, has aided us on many occasions in the study of various health measures pending in the Legislature. On several occasions we have championed successfully our own projects. Single-handedly we brought about the transfer of the maritime quarantine at the Port of New York from state to national control. Until recently, our report on *Maritime Quarantine in the United States* was the only history of quarantine in this country.

Following our inquiry into the coroner situation, the matter was taken up by the then Commissioner of Accounts, Mr. Leonard M. Wallstein, and the coroner was legislated out of existence in the five counties comprising

New York City, and has been superseded by the efficient office of Medical Examiner which, for the last twelve years, has been occupied by Dr. Charles Norris.

With our aid, the obsolete law relating to cadavers was supplanted by the present law. The new law differentiates between an *autopsy* and a *dissection*, which the old law did not; allows the removal of organs for scientific purposes, which the old law specifically forbade; and eliminates "the friend" from preventing the performance of a post mortem.

Recently we drew up a covenant with the Metropolitan Funeral Directors' Association which will, we hope, remove many grievances and misunderstandings, and which will bring about coöperation on the part of the undertakers in securing consent for necropsies. This document, prepared by a subcommittee under the chairmanship of Dr. Ward J. MacNeal, has been submitted to the Council of the Academy for their approval.

Our book on the *Outline of Preventive Medicine*, published by Paul B. Hoeber & Company in 1929, is one of the first attempts to summarize the opportunities of applying preventive principles in every branch of medicine. The Greater New York Committee on Health Examinations endorsed this text book and, through arrangement with the publisher, secured wide distribution of the book among the profession in this City.

The motto of our Committee has been: "Homo sum: humani nihil a me alienum puto"—nothing that touches human welfare is foreign to us. Either at our own initiative or at the request of the various city or state or federal departments of Health, Hospitals, Public Welfare, Education, Civil Service, Police, Prisons, Water Supply, or of the many civic agencies, we have dealt with every problem in the broad field of public health activity. Our relations with the City Departments have been most satisfactory and close coöperation has existed since the inception of the Committee's work. Annually, the budgets of the City Departments, particularly that of the Department of Health

and of the Department of Hospitals (formerly the Department of Public Welfare and Bellevue Allied) have been studied in conferences with the Commissioners, prior to the submission of the budgets to the Board of Estimate and Apportionment.

From day nurseries, malnutrition among school children, the supervision of summer camps, and special classes for the cardiopathic and the crippled, to the care of the decrepit in almshouses; from the protection of the milk and water supplies, the supervision of food handlers, the adulteration of foods and drugs, through typhoid fever inoculation, to harbor pollution and sewage disposal; from the collection and administration of poliomyelitis convalescent serum to the Calmette-Guérin vaccine; from the control of the feeble-minded and drug addiction, to the sterilization of the unfit; from automobile accidents, tetraethyl lead, carbon monoxide poisoning, asphyxia, resuscitation, and oxygen therapy, to ventilation, open stair tenements and multiple dwellings; from chlorine treatment of colds to Coué-ism; from venereal diseases and stillbirths, through "twilight sleep" to nurse anaesthetists; from radio broadcasting to medical ethics; from the training of doctors and nurses, to marriage laws of minors; from continuation schools and industrial medicine to X-ray treatment of hypertrichosis in beauty parlors; from ringworm, through rickets, to rabies; from optometry, anti-vivisection, and chiropractors to insane asylums; from the control of proprietary and open hospitals to group practice, pay clinics, workmen's compensation, health insurance, and medical and surgical accountability; from standards of physical fitness of teachers, and the employment of teacher mothers in schools, to state censuses—I could go on almost ad infinitum. I must, however, single out one subject, and that is "birth control," because this was the only pronouncement of ours which some of the editorials in the metropolitan daily press designated as "epoch making" and because it has a history peculiarly its own. It has been popping up every once in awhile through the course of a dozen

years or so. Although we did not mind dealing with "the population problem," we eschewed "birth control"—the name was offensive, sort of propagandistic. One day Dr. Dana recalled that "the Greeks had a word for it" and we began calling it "oligogenics." From then on the road was smooth. There is a great deal in a name, even in an Areopagus like ours.

I do not know whether there is any other organization which has the same esprit de corps as ours, where there is so much freedom of discussion and the same lack of restraint in "thinking aloud." Because of continuity of policy, concentration of effort, and cumulative experience, it has been possible for the Committee to achieve what it has.

I do not wish to indulge in vaticinations which are proverbially dangerous. I dare say, however, that in addition to the discussion and consideration of the same problems with which we have dealt heretofore, and which forever take on protean forms with changing conditions and new developments, we will be dealing more than we have done in the past, with the important economic aspects of preventive and curative medicine. I believe that we are soon to behold an epiphany of a new era, much as we may dislike it. I hope, however, that we shall always continue to take the part of the corypheus and not that of the epigonus, of the pathfinder and not of the trailer, and that we shall never feed oats to Pegasus.

#### REMARKS, CHARLES L. DANA

When thinking over what I would say tonight there came to my mind an old anecdote with regard to a stranger lost on the Arabian desert. Meeting an Arab chief the stranger asked him how he could find his way through the desert and out. "Follow the tracks of the camel," said the Arab chief. "I see no tracks of a camel, only those of a man," said the stranger. "The man is carrying the camel" was the reply.

This inversion of activity seems to me to apply to the Chairman of the Public Health Committee and Dr. Corwin. I was Chairman of the Committee for eighteen years but you will find no marks of my feet in this academic sand, only the specially deep impressions of Dr. Corwin's tread.

My experience in this elevated type of transportation has been interesting and enlightening. Dr. Corwin has been an efficient administrator, and has carried on the work with wise and tactful initiative and we have had consistently and uninterruptedly agreeable social and business relations throughout these twenty years.

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## REPORT ON NECROPSIES

*Prepared by the Joint Committee representing*

THE NEW YORK ACADEMY OF MEDICINE, THE NEW YORK  
PATHOLOGICAL SOCIETY, AND THE METROPOLITAN  
FUNERAL DIRECTORS' ASSOCIATION.

The Committee met on December 23, 1930, on January 12, 1931, and on January 19, 1931. Various phases of the problem were discussed at these meetings and a substantial agreement was reached.

### *A. Desirability of Necropsy.*

1. All agree that the post-mortem examination by a pathologist is desirable; first, to provide reliable recorded information concerning the cause of death and the nature of the various disease processes in the particular body; second, to confirm or amend the opinions formed by the physicians during the life of the patient so that they may serve the next patient with greater confidence and skill; third, to reveal to the physicians continually the physical changes in the interior of the body which are associated with disordered behavior during life; fourth, to provide for the advance of human knowledge concerning the nature of disease in general. It is clearly evident that the practice of post-mortem examination in a hospital exercises a constant influence to improve the service and to correct serious deficiencies, as well as to improve diagnosis and prevent disease.

### *B. Coöperation of Hospital Authorities and Funeral Directors*

1. The hospital and its medical staff have not completed their service to the family upon the death of a patient. They owe to the family a further service, namely, to give an account of what has occurred, together with the most



accurate possible explanation. This requires that some representative member of the family come to the hospital for a personal interview and to give permission for the examination of the body of the deceased. The funeral director must recognize this relationship and should not oppose the proper efforts of the hospital authorities and the physicians in the discharge of this obligation.

2. The funeral director is particularly interested in getting into his own hands: (1) the death certificate, (2) the permit to remove the body, and (3) the body itself, so that he may prepare the body in a satisfactory manner for the funeral ceremony and may be certain that nothing will arise to interfere with his plan and program. Unforeseen delay may require cancellation of contracts for transportation and various other services, thus increasing the expense and causing dissatisfaction. Unreasonable delay by the hospital, in its attempt to obtain permission for necropsy, is, therefore, objectionable to the funeral director. The conflict of interests in this connection requires mutual consideration and a spirit of coöperation on the part of all concerned. Particular disputes should be considered by a permanent committee on coöperation.

3. The funeral director or his agent must present to the hospital acceptable written authority from the family of the deceased. The printed form now employed by the Metropolitan Funeral Directors should be slightly altered so that the signature of the next-of-kin will appear on the written authorization, along with the sworn statement of the funeral director to the effect that he has been properly engaged to take care of the body.

4. Hospital employees, in general, must not give information to favored funeral directors nor to any other unauthorized persons in regard to persons critically ill or dead in the hospital. It is proper for the chief administrative officer of the hospital, when requested by the family, to refer the selection of a funeral director to the office of the Metropolitan Funeral Directors' Association, or, quite

properly, to select one by rotation from an approved list in his own office. Such a selection must never be left to a minor employee of the hospital. Proof that a minor employee has offered recommendations of this sort should be followed by his instant dismissal from the service.

5. The hospital authorities should make certain that the necessary data for a death certificate, except those facts relating to the nature, progress and termination of the present illness, are recorded on the chart record at the time of admission of the patient. Such data as date of birth and maiden name of mother may be obtainable only with great difficulty after death of the patient. The death certificate may very well be filled out by a clerk using a typewriter, leaving only the diagnosis and signature to be supplied by the physician who completes the certificate.

6. Report of a death to the Medical Examiner should be made in those circumstances where this is legally required, and the decision to notify this official should be made at the time of death of the patient, entirely without regard to the attitude of the relatives concerning necropsy. It is improper for any member of the hospital staff to threaten to call the Medical Examiner if permission for necropsy is refused. Any such procedure of threatening or browbeating may be regarded as evidence of lack of ability to handle the situation.

7. In general, the permission for necropsy should be asked for soon after the death has occurred. Often it is best to make the request at once whenever the proper relative of the deceased is present in the hospital. Reasonable consideration should be accorded to everyone concerned in determining when the matter has been adequately presented and the final decision reached.

8. Arrangements should be worked out in every hospital whereby the unnecessary loss of time on the part of the funeral director may be obviated and the funeral director should be instructed that he will be promptly informed

by telephone when the death certificate is signed and the body is ready for him.

The telephoned information in regard to the dead, particularly before a funeral director is known to have been engaged, should be given only by an executive officer of the hospital and should be carefully guarded unless the persons on the wire are personally known.

9. Interference by a funeral director with the legitimate efforts of the hospital to obtain permission for autopsy shall be regarded as a reportable grievance.

### C. *Technic of the Necropsy.*

1. The prosector should perform his examination in such a way as to facilitate the subsequent work of the embalmer and funeral director. The main longitudinal incision should end over the mid-sternum and curved incisions with concavity toward the head should be carried laterally to either shoulder, especially to provide for decollete in the female. In general, ligature about each carotid should be left hanging out of the sutured incision at the finish. When the skull is opened the frontal bone should be cut above the hair line and the base of the skull cemented with plaster before replacing the skull cap. When the neck organs and tongue are removed, the head should first be embalmed through the carotids unless there is a serious contra-indication. An embalmer, representing the funeral director, should be a welcome associate at the necropsy table.

2. During the necropsy, the skin should be kept free from blood or other material which may be adherent if neglected and allowed to dry.

3. The necropsy should be completed and the body prepared ready for the funeral director punctually at the time promised whenever there has been an advance agreement in regard to this matter.

### D. *Special Recommendations.*

1. We recommend the approval of this report by the Metropolitan Funeral Directors' Association, the New

York Pathological Society, and The New York Academy of Medicine.

2. We recommend that printed copies be distributed (a) to the members of the Metropolitan Funeral Directors' Association and to such other funeral directors as may request such copy; (b) to the superintendents of hospitals in the City of New York; (c) to the members of the New York Pathological Society.

3. We recommend the appointment of a continuing Joint Committee, made up of one or more representatives of each of the following groups: (a) The Metropolitan Funeral Directors' Association, (b) The New York Pathological Society, and (c) The New York Academy of Medicine, with authority to associate with them a representative of the hospital executives. It is understood that this Committee shall inquire into grievances as they may arise in regard to necropsy service, and may from time to time make further recommendations to their respective organizations.

4. We recommend that this report be brought to the attention of the American Hospital Association, the American Association of Pathologists and Bacteriologists, the American Medical Association, the American College of Surgeons, the American College of Physicians, the National Association of Selected Morticians, and the National Funeral Directors' Association, through the agency of the New York Academy of Medicine.

April 8, 1931.

Approved by the Council of The Academy of Medicine on May 27, 1931.

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# POLIOMYELITIS IN NEW YORK CITY

## PROGRESS REPORT OF THE SUB-COMMITTEE

In 1928 the Public Health Committee appointed a sub-committee consisting of Drs. Royal S. Haynes, George Draper, W. Lloyd Aycock, William H. Park, Simon Flexner, Josephine B. Neal, Philip Van Ingen, Harold L. Amoss, E. H. L. Corwin and Linsly R. Williams, to carry out an experiment on the treatment of early cases of poliomyelitis with human convalescent serum.

A small sum of money was secured and human convalescent serum obtained from a large number of individuals, the majority of whom offered their blood in order to help others. This serum was collected by a number of younger physicians, chiefly at the Cornell Clinic. The Committee expresses its appreciation to the staff of the Clinic for its most helpful coöperation.

A number of the younger physicians in the city who were interested in the scheme have coöperated with the Committee in the administration of the serum. The following brief report of the work done by these young physicians has been prepared by Dr. Alfred E. Fischer:

The results of the work have been encouraging enough to warrant further study. While no complete analysis as yet has been made because of insufficient data, the Committee feels that a preliminary statement of the results of the therapy may be made at this time.

In 1928 there were 61 cases of poliomyelitis treated with serum. Twenty-one of this number were preparalytic of which 3 died. Of 12 cases in which paralysis was present less than 12 hours, 2 died, a mortality of 15 per cent. The remaining cases were paralyzed longer than 12 hours when serum was administered. Thirteen out of 30, a mortality of 33 per cent, died in the latter group. This compares with

a mortality of 29 per cent of 67 cases treated at Willard Parker Hospital during the same year, and a general city mortality of 26 per cent.

In 1929 there were 71 and in 1930, 78 cases of poliomyelitis in the city. Only 3 cases of preparalytic poliomyelitis in 1929 received serum, and 1 in whom paralysis was present less than 12 hours also received serum. None of these died.

In 1930, 6 preparalytic cases and 1 in whom paralysis was present less than 12 hours were treated. None of these died. The total number of preparalytic cases treated during the 3 years was 30 and 14 patients were treated in whom paralysis was present less than 12 hours.

The mortality of poliomyelitis in New York City during the year 1929 was 35 per cent and during 1930 was 16 per cent. In each of these years the morbidity was low and the difference in mortality does not necessarily mean an increased virulence of the disease in 1929. It suggests rather an insufficient number of cases upon which to make a comparison and reminds us that large groups of cases must be used when estimating therapeutic results.

The extent to which paralysis has been modified in cases that have received serum is beyond the scope of this report. In years when the morbidity is high a comparison of treated and untreated cases can be made with regard to end-results. In non-epidemic years the number is too few for comparison.

The following case, which was treated by Dr. J. M. Lewis, is typical of the group we have been studying:

A. B., 8 years old, became ill on September 27th, 1930. He vomited and had a temperature of  $102^{\circ}$  on that day. On September 30th his neck became stiff and on October 4th and 5th, he developed a paralysis of some of the muscles of his right arm and both lower legs.

His young brother, J. B., age 3 years, became ill on October 5th with a temperature of  $103^{\circ}$  and the following

day his neck became somewhat stiff. He was flushed, had an injected throat and his spine was rigid. His deep reflexes were exaggerated and he had a slightly positive Kernig sign. Because of these symptoms and the fact that the brother had a definite poliomyelitis, a lumbar puncture was done 33 hours after the onset. The spinal fluid was clear, contained 40 cells of which the majority were lymphocytes. At the same time 20 c.c. of convalescent poliomyelitis serum was given intraspinaly and 40 c.c. intravenously. The following day a second dose of 20 c.c. was given intraspinaly. Due to the serum there was an increase in the rigidity of the neck and spine but within a week this had cleared up. When seen on October 20th, 15 days after the onset of his illness, he had no paralysis in striking contrast to the disease in his brother.

This was a contact case of poliomyelitis which when seen by one of the members of the Poliomyelitis Committee was in the preparalytic stage. The presence of the disease in the brother suggested the diagnosis which was confirmed by the clinical symptoms and spinal fluid findings.

The work will be continued this year and physicians are asked to notify the Academy of early and suggestive cases so that the diagnosis can be verified by a member of the Committee and serum injected. A therapeutic result is always most difficult to evaluate and it is only by a carefully controlled study over a period of time that the efficacy of the serum can be accurately determined.

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## OBITUARY NOTICES

### CHARLES NORTH DOWD

Dr. Charles North Dowd, a Fellow of the Academy of Medicine since 1889, died on May 24th, 1931 in his seventy-fourth year at his home in Saratoga Springs. Dr. Dowd had retired from practice four years ago.

He graduated from Williams College in 1878, and from the College of Physicians and Surgeons in 1886. He had served as Attending Surgeon at the Memorial Hospital from 1894 to 1914, at St. Mary's Free Hospital for Children from 1905 to 1914, and at the Roosevelt Hospital from 1914 to 1924. He also served as Consulting Surgeon at the Roosevelt and St. Mary's Hospitals. He was a Major in the United States Army Medical Corps from 1917 to 1919. He was Professor of Clinical Surgery at the College of Physicians and Surgeons, and was a member of many medical societies, and made many contributions to surgical literature.

In the death of Dr. Dowd the Academy of Medicine has lost a Fellow who was at all times keenly interested in promoting the ideals of the profession and who gave freely of his time and talents to make available the opportunities for advanced medical education in New York. He was chairman of the Committee on Medical Education for the first two years of its existence.

The activities of the Bureau of Information which are now carried out by the Committee on Medical Education of the Academy had its origin in a meeting held in 1912 in the office of Dr. Lucius Hotchkiss at which were present Charles N. Dowd, Howard C. Taylor and the writer. At that meeting the "Society for the Advancement of Clinical Study" was formed for the purpose of maintaining a bureau of information for visiting and local physicians in order that the vast facilities that existed in New York might be made readily accessible to those desiring them.

At that time there was no central bureau where a visitor could learn what surgical and medical clinics were going on each day. The Council of the Academy generously provided a room in the building for the necessary office and also space in the hall for a large bulletin board for the posting of clinics and information.

The work of the Society was financed entirely by subscriptions from those interested. It met with success from the start and was carried on until 1923 when its activities were transferred to the Academy of Medicine and the work taken over by the Committee on Medical Education.

Dr. Dowd was the President of this Society from its inception until it was dissolved in 1923, and its success was largely due to his personal efforts and devotion to its objects. Through his wise guidance the Society was safely launched and developed into a strong agency for the promotion of post-graduate medical education by making available the abundant clinical opportunities of New York to the profession. This work is now being carried on today and expanded into broader fields by the Committee on Medical Education.

The Academy owes a debt of gratitude to Dr. Dowd for this pioneer work in promoting post-graduate medical education.

GEORGE GRAY WARD.

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#### SHIBASABURO KITASATO

The death of Shibasaburo Kitasato in Tokyo on June 13, 1931, recalls the great days of the beginnings of bacteriology, when Pasteur and Koch and a host of other workers were finding new pathogenic organisms nearly every year. Kitasato, one of Koch's most brilliant pupils, worked chiefly in the Institute for Infectious Diseases in Berlin during his active career. Later he returned to Japan, devoted himself to teaching and administrative work, and ceased to be a fruitful scientific investigator.

His best known Japanese pupils of this period are Shiga and Noguchi. His name will always be associated with three important discoveries. In 1889 he found a method of obtaining pure cultures of the tetanus bacillus, which Nicolaier had previously discovered in 1884 by inoculation of animals with samples of earth. Kitasato's high technical skill enabled him to devise a means for removing the contaminating organisms and then grow the tetanus organism in an atmosphere of hydrogen. In 1890 Kitasato published with von Behring a classical paper on immunization against tetanus, which has become the basis for the production and wide use of this anti-serum at the present time. A week later von Behring published a paper on immunization against diphtheria anti-toxin, the toxin itself having been discovered shortly before in the Pasteur Institute by Roux and Yersin, so that to von Behring and Kitasato must be granted the splendid achievement of the discovery of practical anti-toxic immunity. After this discovery Kitasato published many interesting observations concerning the varying susceptibility of animals to tetanus toxin, horses being the most susceptible, while fowls require 300,000 times as much toxin as the horse to produce symptoms. He showed that the organs of an animal dead of tetanus are non-toxic and even the central nervous system, in which toxin might be suspected of accumulating, was harmless on injection into animals.

In 1894 a great plague epidemic was raging in China, and the Japanese Government sent Kitasato and Aoyama to Hong Kong on the 12th of June. On the 14th an autopsy was performed on a patient, and Kitasato found the *B. pestis* in the lymph nodes, blood, spleen, and other organs. Kitasato also discovered the plague bacillus in the blood of a living human case. Cultures were readily effected, and animal inoculation of the pure cultures showed that the organism of the Black Death had been discovered. Only a few days later the French bacteriologist, Yersin, arrived from Saigon and was able to confirm Kitasato's results.

Kitasato returned to Japan and there founded in 1892 the Governmental Institute for Bacteriology, and the Kitasato Institute for Infectious Diseases in Tokyo in 1914. While his name will always be associated with some of the most important discoveries in bacteriology, his achievements were due more to industry and skilled laboratory technique under the tuition of his great teacher, Dr. Koch than to great original genius. He therefore cannot be ranked intellectually with Koch, Pasteur, or even Loeffler and von Behring, who made the great fundamental discoveries in the golden era of bacteriology, despite the fact that his work was of high caliber and of great practical importance.

FRANCIS CARTER WOOD.

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## DEATHS OF FELLOWS OF THE ACADEMY

EUGENE LYMAN FISKE, M.D., 25 West 43 Street, New York City; graduated in medicine from the University of the City of New York, New York City, in 1888; elected a Fellow of the Academy November 4, 1909; died, July 5, 1931. Dr. Fiske was a Fellow of the American Medical Association, a member of the County and State Medical Societies, a member of the American Public Health Society, the American Society for the Advancement of Science and a member of the National Tuberculosis Association. Dr. Fiske was Medical Director of the Life Extension Institute from the time of its organization in 1913 until his death.

ALLEN FITCH, M.D., 16 East 96 Street, New York City; graduated in medicine from Union University, Albany, N. Y., in 1879 and from the University of the City of New York, in 1880; elected a Fellow of the Academy June 4, 1896; died, June 29, 1931. Dr. Fitch was a member of the County and State Medical Societies, a member of the Neurological Society and a member of the Society of Alumni of Bellevue Hospital.

LOUIS ADOLPH KOCH, M.D., 16 Chestnut Street, Newark, N. J.; graduated in medicine from the University of Maryland, Baltimore, Maryland, in 1902; elected a Fellow of the Academy May 6, 1909; died, July 7, 1931. Dr. Koch was head of the Dermatology Department of the Newark Dispensary, on the staff of the Newark City Hospital and a member of the New Jersey Medical Society.

JOHN OSBORN POLAK, M.D., 20 Livingston Street, Brooklyn, N. Y.; graduated in medicine from the Long Island College Hospital and the University of Vermont, Medical Department, in 1891; elected a Fellow of the Academy June 6, 1895; died, June 29, 1931. At the time of his death Dr. Polak was a Vice-President of the Academy. He was a Fellow of the American Medical

Association, a Fellow of the American College of Surgeons, a member of the County and State Medical Societies, a member of the American Association of Obstetrical, Gynecological and Abdominal Surgeons, a member of the American Board of Obstetrics and Gynecology, a member of the American Gynecological Society, New York Obstetrical, Gynecological and Pathological Societies; Professor of Obstetrics and Gynecology to Long Island College Hospital Medical College, Gynecologist and Obstetrician the Long Island College Hospital, Consulting Gynecologist to Bethony Deaconess, Jewish, Caledonia, Coney Island and Israel-Zion Hospitals, Brooklyn, People's Hospital, New York. He was Consulting Obstetrician to the Methodist Episcopal Hospitals of Southampton, L. I. and Nyack, N. Y.

MEYER MAURICE STARK, M.D., 156 West 86 Street, New York City; graduated in medicine from the College of Physicians and Surgeons, New York City, in 1899; elected a Fellow of the Academy January 4, 1912; died, June 18, 1931. Dr. Stark was a Fellow of the American Medical Association, a Fellow of the American College of Surgeons, a member of the County and State Medical Societies, and a member of the Society of Associated Alumni of Mt. Sinai Hospital. He was connected with the gynecological departments of Mt. Sinai, Sydenham, Knickerbocker and Community Hospitals. He was also on the gynecological department staff of the Beth Israel Hospital dispensary and was an instructor in the department of experimental surgery of the New York University Medical School for two years.

JARVIS SHERMAN WIGHT, M.D., 30 Schermerhorn Street, Brooklyn, N. Y.; graduated in medicine from the Long Island Medical College, Brooklyn, N. Y., in 1895; elected a Fellow of the Academy March 7, 1918; died, July 7, 1931. Dr. Wight was a Fellow of the American Medical Association, a Fellow of the American College of Surgeons, a member of the County and State Medical Societies, a member of the American Society for the Advancement of Science, a member of the Pathological and Surgical Societies and Surgeon to the Long Island College Hospital.

BULLETIN  
OF  
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*Symposium in Memory of  
Thomas W. Salmon*



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THOMAS W. SALMON  
1876 - 1927

## FOREWORD

The first milestone marking the way toward the objective of the Thomas W. Salmon Memorial has been reached. The sum of money required for the establishment of a Lectureship has been subscribed and the trust of administering this fund has been accepted by The New York Academy of Medicine.

In the following Proceedings of the Memorial Meeting held on January 10th, 1931, will be found expressions of deep regard, affection and respect presented by some of Doctor Salmon's distinguished friends. They have valued him, in these tributes, as highly as man can be valued, yet even their eloquence leaves much unexpressed and inexpressible by words alone. We know his mind was stored with useful knowledge, that his wisdom was drawn surely and clearly from his own experience and that of others, that his courage was great and his sensitiveness exquisite. We know that this wisdom, this skill and this sensitiveness constitute the ringing truth of his record of service. Yet, in the final analysis, neither the profound spiritual quality of the man, nor the strength and fine flavor of his friendship can be caught in words, though they formed the great driving force of his extraordinarily productive life of steadfast devotion to his fellow man, for whom he labored so selflessly and gladly.

For this reason, it is at once our privilege and our responsibility, laid upon us by his untimely death to carry on, as best we may, his professional ideal of unselfseeking service.

To this end, a Lectureship under his name has been

established to crystallize in specific form, as nearly as we can, the purpose of his life; to keep alive his immortal qualities as a great physician, that we who have so richly benefited by his friendship, his understanding, his knowledge and his skill may share these gifts with those of our own profession and of the public who were less fortunate than we. The award of this Lectureship in the years to come will be not only a mark of distinguished achievement but the highest honor, in that the recipient has been judged worthy to don for a space the mantle of that wise physician, that tender friend, that true and "veray parfait gentil knight," Thomas W. Salmon.

AUSTEN FOX RIGGS.

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THE NEW YORK ACADEMY OF MEDICINE  
MEMORIAL MEETING

IN HONOR OF  
THE LATE DR. THOMAS W. SALMON

HOSACK HALL, SATURDAY, JAN. 10, 1931 AT 8 P.M.

*Presiding*  
LEWELLYS F. BARKER, M.D., LL.D.

*The Effect of Dr. Salmon's Life on the Community*  
THE REV. HARRY EMERSON FOSDICK, D.D.

*Psychiatrist and Teacher*  
LOUIS CASAMAJOR, M.D.

*Mental Hygiene Pioneer and Leader*  
HOMER FOLKS, LL.D.

*Soldier and Officer*  
BRIG. GEN. SANFORD H. WADHAMS

*The Thomas W. Salmon Memorial  
Presentation of the Fund*  
WILLIAM L. RUSSELL, M.D.

*Acceptance by the President of the Academy*  
JOHN A. HARTWELL, M.D.

*Announcement by The Thomas W. Salmon Committee  
of the Academy*  
C. C. BURLINGAME, M.D.

THE CHAIRMAN: On asking the meeting to come to order, I may say that I am sure you are all very sorry, as I am, that the Honorable George W. Wickersham, who was to act as Chairman, has been detained by public duties in Washington. He regretted very much that he could not be present. When, therefore, Dr. Frankwood E. Williams, the Chairman of the Memorial Committee, telephoned me of the circumstances and asked me to come to New York to preside at this meeting, I felt it not only a duty but a genuine privilege to obey the summons.

We have come together tonight to do honor to the memory of a great physician, a great psychiatrist, and a most public spirited citizen, one who, it is not too much to say, changed the course of the history of medicine and of psychiatric work in this country. As you know, this is a memorial meeting in honor of the late Dr. Thomas W. Salmon, and in connection therewith a substantial gift is to be made to The New York Academy of Medicine to perpetuate his memory.

The course of the program has been slightly altered. Inasmuch as one of the several speakers is compelled to leave the meeting rather early, I shall call upon him first. He is the Pastor of the Riverside Church, is Professor of Practical Theology in the Union Theological Seminary, and has written a number of important religious works. He was closely associated in work with Dr. Salmon in the latter's practicing years. As you know, the psychiatrist and the clergyman have, of late, found it advantageous to work together in many cases. This first speaker and Dr. Salmon had arranged together a program, which they had hoped

to carry out when the new Riverside Church was finished, in order to show what could be accomplished in a practical way through the combination of psychiatry and religion.

I shall ask the Reverend Doctor Harry Emerson Fosdick to open the meeting with an address upon "The Effect of Dr. Salmon's Life on the Community." (Applause.)

REV. DR. HARRY EMERSON FOSDICK

Humanity is divided into two groups: those who treat life as a trade and those who treat life as an art. Those who treat it as a trade live for what they can take out of it; those who think of it as an art live for what they can put into it. The one kind is represented by the head of a corporation dealing in a necessity of human existence, who before a court of law said that he proposed to squeeze out of the public all that he could in return for his merchandise. Life to that man was a trade. The other kind is represented by Professor Palmer, of Harvard, who said, "Harvard pays me for doing what I would gladly pay for the privilege of doing, if I could only afford it." Life to him is an art.

As between these two sorts of people, there is no question where the man belongs whom we honor tonight. Dr. Salmon never treated life as a trade. He always treated life as an art. It was not to him something out of which he tried to take all he could; it was to him something into which he put all he could.

One of the finest expressions of this artistic attitude toward life was put by George Eliot upon the lips of Stradivarius, maker of beautiful violins:

" . . . when any master holds  
'Twixt chin and hand a violin of mine,  
He will be glad that Stradivari lived,  
Made violins, and made them of the best.

The masters only know whose work is good:  
They will choose mine, and while God gives them skill  
I give them instruments to play upon,  
God choosing me to help Him."

That, I take it, was Dr. Salmon's spirit. That indeed is the glory of the professions—the truly professional man, being one who treats life as an art, takes pay for his work but does not primarily work for pay. He works for the joy and pride of fine workmanship.

I well recall the first case that I took up with Dr. Salmon. I had met him for years in official association on various boards and then, beginning ministry here in New York, I had a case come to me far beyond my power to diagnose or to treat if I could have understood what was the matter. So, taking advantage of my acquaintance with Dr. Salmon, I took up the case with him and thus began a long series of coöperations on various types of mental and emotional disorder. I learned to love him as I have loved and admired few men I have known. One could always be sure that when a personality was put under his care, he would reverence that personality. Freely, gladly, as though it were a privilege and not a task, he gave himself to these cases of mine and then sat for hours with me introducing me into the secrets of modern psychiatry, giving me all that I have known about the best methods of individual work, out of sheer joy, I think, at finding a mind that kindled with responsive glow to his instruction.

He was a great professional man. Life to him was not a trade, but an art.

There is a story told of Sir Bartle Frère, an Englishman. He was making his first visit to a Scottish house. The master, in sending a servant to meet him, was wondering how he would help the servant to recognize the man when he came. At last the master of the house hit upon this



device: He said, "When the train comes in, you will see a tall gentleman, helping somebody."

That is a true description of Dr. Salmon—a tall gentleman, helping somebody. We have in him a fine exhibition of the modern saint. There was the old style saint who withdrew himself from the ordinary work of life. But there is a new style saint, a man namely, with an unselfish spirit and a scientific technique. No generation in the world's history before ever had a chance at that kind of personality—an unselfish spirit plus a scientific technique. There are two things in this modern type—one very old, the unselfish spirit, the source of whatever dignity across the centuries our human nature has possessed. It is as ancient as the prophet who said, "What doth the Lord require of thee, but to do justly, and to love kindness, and to walk humbly with thy God?" It is as old as Christ, who said, "Whosoever would be first among you, shall be servant of all."

Along with this old thing, however, there is something new, the scientific technique. Now arises the man no longer fooled by superstition and supernaturalism; living in this new earth, where if he asks nature the same question in the same way, she will always give him the same answer, where if he fulfills conditions he gets results, and never will get results until he does fulfill conditions—where, therefore, he has in his hands a dependable technique. This makes the new saint an unselfish spirit plus a scientific technique.

All the hopes of mankind depend upon that kind of personality, and of that new type of saint Dr. Salmon was an illustrious example. (Applause.)

THE CHAIRMAN: Someone has said that "the secret of service lies in character," and Dr. Fosdick has shown us how the achievements of Dr. Salmon depended in a large

part upon his personal qualities of character. Indeed, it has been said of Dr. Salmon that, though his medical achievements were of high importance, his personal qualities of character were even greater.

Dr. Fosdick has shown us what a psychiatrist of Dr. Salmon's type can do for the community. We shall next hear about Dr. Salmon as a psychiatric specialist and as a teacher. A speaker to discuss that topic adequately must have been closely associated with Dr. Salmon, and must have been thoroughly familiar with his work as a scientist, on the one hand, and as a teacher of scientific and practical psychiatry, on the other. The one chosen to address you on these aspects of Dr. Salmon's life was one of his colleagues at Columbia University. As most of you know, after the war and after another period of work for The National Committee for Mental Hygiene, Dr. Salmon was appointed Professor of Psychiatry at Columbia University. The Professor of Neurology at Columbia who has been interested also in building up the Department of Psychiatry in the Medical School, is Dr. Louis Casamajor; he will talk to you about Dr. Salmon as "Psychiatrist and Teacher." (Applause.)

#### DR. LOUIS CASAMAJOR

Your Program Committee, honoring me with the designation to speak this evening, has asked me to speak of Dr. Salmon as a psychiatrist and a teacher. Appreciating the honor as I do and cognizant of the importance of the subject assigned to me, I nevertheless am inclined to some disappointment that I was not asked to speak of him as a person and a friend. Great as he was as psychiatrist and teacher, he was greater as a friend. If I feel that I should rather tell anecdotes illustrating Dr. Salmon's rare sense of humor, his kindness and his original point of view, I know I am but facing the same temptation that

will beset those who follow me on this program. I shall restrain myself for surely they will succumb to it more graciously than can I. All of us here tonight have our favorite stories of Dr. Salmon that we treasure and repeat. In his short sauntering through life he left behind him on all sides so much of wisdom and help, colored by his kindly humor and sprightly epigram, that for most of us that side of him will ever be the one which comes most readily to mind.

Dr. Salmon was before all things a doctor and psychiatry was his chosen field. He loved to care for patients, and mental patients with their great need for intelligent, kindly understanding made an especial appeal to him. He always sensed and felt the other fellow's point of view, for from such have come the great doctors of all times. He found psychiatry somewhat by accident in his early medical years after a brief period of general practice in a small town; and, having found it, he took it as his own, to serve in its temple and advance its cause. Those of us who have observed the rapid advance of psychiatry in America since the war know all too well how great has been the influence of Dr. Salmon in placing psychiatry on a par with its fellows in the specialized practice of medicine.

General Wadhams will speak tonight on Dr. Salmon's service in the war. For this he is better qualified than I who probably served too close to him during those years to get a proper perspective. What he did for the army during the war was great but not so great as what he did for psychiatry. He came into an army which was ignorant of what psychiatry was and what it could do. What he left behind him in the Army organization General Wadhams will tell you. It is within my province to talk about how he did it.

Dr. Salmon was one of the finest teachers it has been my privilege to meet. What he did for the army was done in

his capacity as a teacher. Wherever he went and to whom-ever he met he talked psychiatry. His was the rare gift of the natural teacher, of making anything he talked of interesting and easy to understand. I doubt if he knew he was teaching nor did those whom he taught know they were being taught. They only knew that a new point of view had come into their thoughts—one which they could never forget. Dr. Salmon's work in the Army in France will stand as a triumph of education.

After the war we asked Dr. Salmon to take the chair of psychiatry in Columbia. At first he refused, claiming that he was not a teacher. Up to that time the teaching of psychiatry in Columbia had been a pretty sorry affair. I can speak with authority on that matter for I had done much of that teaching myself. Only in the fourth year of the course was psychiatry even mentioned to the students. Under Dr. Salmon, psychiatric teaching was begun in the second year. This, at first, was looked upon by the faculty as a radical innovation but it was grasped by the students as a golden opportunity. To his teaching in Columbia he brought the same simplicity and directness of thought that had made psychiatry a living thing in the army. The students were quick to learn from him that psychiatry is not merely a specialty of medicine but a part of everyday life in the practice of medicine. We of the faculty have seen that spirit grow in P. & S. until now the time allotted to psychiatry is well on a par with that of the other great branches of medicine. We of Columbia are proud that we can count Dr. Salmon as one of us and can carry on the work that he built on so firm a foundation.

We have gathered here tonight to take the last step that will materialize Dr. Salmon's memory for posterity. No one of our generation deserves that tribute more than he, nor could our generation find a better symbol to perpetuate itself. Our only fear must be that in the future he may become only a symbol. To us, who were privileged to know

him, and to love him, he was much more than that. He was a person and a friend. (Applause.)

THE CHAIRMAN: It is but little wonder that Dr. Casamajor was delighted to have Dr. Salmon as Professor of Psychiatry in Columbia; this was not only because of Dr. Salmon's scientific reputation, but also because Dr. Casamajor was, himself, one of the consulting neuro-psychiatrists in the A. E. F. where he was in very close contact with Dr. Salmon and where he had exceptional opportunities of observing the practical character of his work. I emphasize the practical character of his work, for not every professor nor every teacher is what we call "a practical man." Of course, it is well that professors and teachers shouldn't be merely practical; they must be theoretical as well. But some professors and some teachers seem to have the practical side left out of them. Dr. Salmon knew the theory of his subject and respected its fundamental principles, but he also knew how to get practical results. As Dr. Casamajor has pointed out, he was first of all a physician; he wanted to help people, and he was, fortunately, able to translate into practice the principles of the science that he professed.

Dr. Salmon also realized (when he was approached in connection with the great mental hygiene movement, symbolized by The National Committee for Mental Hygiene that was initiated by Mr. Clifford W. Beers, whose energy and enthusiasm have done so much to forward it) that before a great deal could be done in the way of true mental hygiene, it was necessary to secure better care for those who were already mentally afflicted. Until better care was provided for them and until after more complete studies of those who were already sick had been made, the hope for a knowledge of causes of mental disturbances and, through that knowledge, for a true preventive mental hygiene movement seemed to him to lie remote. In my

own association with the work of the National Committee, I saw abundant evidence of the soundness of Dr. Salmon's conceptions.

We have next to hear an address upon Dr. Salmon as "mental hygiene pioneer and leader," and the one who will speak to you upon that topic has, himself, been a distinguished social worker. As Secretary of the New York State Charities Aid Association, as President of the National Conference of Social Work, and as officer in a dozen or more of our important welfare agencies, he has had experiences that make him peculiarly fitted to deal with the topic that has been assigned to him. His interest in the care of mental patients brought him into early and close contact with Dr. Salmon and he learned to have a very high esteem for him. Mr. Homer Folks, as many of you know, also became a member of The National Committee for Mental Hygiene and has been a valued member of its Board of Directors. He has, for years, had much to do with mental hygiene work in New York State. (Applause.)

### MR. HOMER FOLKS

Mental Hygiene Pioneer and Leader! A pioneer seems to be a person who goes out somewhat farther than men have been before. Unlike the explorer, he goes out to stay. He labors prodigiously, long hours, day and night, week in and week out, year in and year out. He endures hardships. He usually has a certain feeling of loneliness. In the end, after a long life of pioneering, he leaves a place which is vastly more suitable for man to occupy, and more comfortable and more beautiful, than it was when he found it.

Dr. Salmon was truly a pioneer in mental hygiene.

It seems almost incredible that it is three and one-half years since Dr. Salmon went for a week-end trip from which he was destined not to return. But as his figure

recedes in point of time, it is not diminished; rather it becomes more definite and the general outline more clear as the details become less distinct. As I think of him now, it strikes me that he led a peculiarly consistent life throughout. Through various changes and stages and occupations he was the same. I do not mean a consistent life in the narrow intellectual sense; but a consistent life from the point of view of a dominant continuing objective, and a persistently consistent personality under any and all circumstances.

His philosophy of life, as I knew him, seemed to be, in substance, that for every evil there was a remedy; for every injustice, there was a tribunal where it could be corrected; for every door locked in front of an opportunity for some person, there was a key and somebody to open the door, and if no one else was at hand, Dr. Salmon was the person to perform all these useful offices. Every contact was an opportunity and a call for service. The prime motive of his life throughout was service to those with whom he happened to come in contact. In all his various connections that seems to me to be the strong, clear, constant motive.

I knew Dr. Salmon first in a piece of work which perhaps most of you know little about, and which is little known generally. It was in 1904 or thereabouts, when Dr. William L. Russell, then connected with the New York State Hospitals, brought Dr. Salmon to the office of the State Charities Aid Association. Dr. Salmon was then connected with what is now known as the U. S. Public Health Service and he had to do with the admission of aliens at Ellis Island. He was a very young looking man and was young in fact, though not as young as he looked. He lived up at Brewster. He already had a family. He had a modest position. In the course of the work at Ellis Island he had observed various occurrences which seemed to him very shocking and yet he found it difficult to accomplish anything toward their correction.

The way immigrants were received who were suffering from mental difficulty, the way they were not cared for while waiting return to Europe and, perhaps above all, the extraordinary neglect, cruelties and wrongs done to them in the course of their return to the old world, not in fact to their homes or home towns, but only to the ports from which they had sailed—all this shocked him.

He was shocked too by the very insufficient measures taken to discover such persons and by the resulting admissions of many hundreds of insane persons who very soon found their way into the hospitals for the insane.

Dr. Salmon came to ask us to take a hand in getting some of those things corrected. He took his official life in his hands by coming at all, because, unfortunately, at that time to his then official superiors, everything was undoubtedly, indubitably and beyond question exactly as it ought to be. In fact, he had been assigned to this duty because there had been some criticisms made by outside people along these lines. A member of the staff who had some knowledge of psychiatry would be just the one to go and say that everything is all right, all the criticisms without any foundation whatsoever. But Dr. Salmon was not that kind of a man. He couldn't have done anything, the facts being what they were, except to undertake to correct those injustices and wrongs that were thrust upon his attention from day to day.

It seemed an incidental thing in a day's work when Dr. Salmon came to ask us to participate in a modest and simple effort to correct some undesirable conditions and occurrences which no person, medical or lay, could possibly defend. As a matter of fact, it involved us and our friends, and all the important people we could reach and all the important people he could reach, and about seven years of work. It involved Federal legislation. It involved changing rules in the Treasury Department, and I don't know what all.



Bit by bit, and step by step, and never falling back, with his knowledge always at our service, and with his unfaltering confidence, the thing moved forward. After about seven years the matter was put on a very reasonable, satisfactory and humane basis.

Dr. Salmon, as I came to know him then, was exactly the same person, looked at things the same way, and went at them with the same spirit, the same determination and from the same motives, as was true of him without change as long as I knew him.

That was near the beginning of his active participation in what we might call mental hygiene, though he had been on duty at one of the state hospitals, primarily for a question of epidemiology.

Then came his connection with The National Committee for Mental Hygiene. If ever there was a job that might be said to have been made for a man; that is, that offered precisely the opportunities that he would most love to undertake, and was most fitted to do, the medical directorship of the National Committee was that for Dr. Salmon. If ever there was a man who was preëminently and particularly fitted for a particular job, from every angle, that man was Dr. Salmon for this position.

Time wouldn't permit going into the details of his work there. He found the National Committee for Mental Hygiene a brilliant movement at the hands of Mr. Beers and his colleagues, and he left it a structural accomplishment. He filled in the picture, already in outline. He gave the movement force and precision, vigor and drive, and made it one of the great forces working for the betterment of human life in America.

It would be fascinating to speak about his work in that Committee; how he went about in those prodigious labors that the pioneer must go through, from state to state, until

some thirty-five states were visited. He went from one hospital to another in those states to see how the insane were cared for, and he didn't stop at the hospitals, but went to the poorhouses, and didn't stop at the poorhouses, but went to the jails, and found sometimes more insane people in the poorhouses than in the hospitals and more in the jails than in the poorhouses. His winning personality and his wonderful spirit won their way in spite of all the criticisms necessarily involved in his reports. State after state swung into line with something like a reasonable mental hygiene program as to institutional care. His thought always went on farther and farther. It included mental hygiene for children, psychiatry in prisons, prevention of delinquency, and stage by stage, it really became a test for practically all phases of human behavior.

As I ask myself, "What in the last analysis, in its most important sense, does Dr. Salmon and his life mean to me," it seems to me I might almost put it this way: Dr. Salmon was born a great soul. He achieved a great intellectual calibre and stature and great effect as a man of action, not in the quiet of the library, but in crowded, overcrowded hours of service to his fellowmen. He demonstrated for all time to come that through action and through service, one may gain great understanding of human life, great ability, and a great measure of influence with his fellowmen. His life suggests that nothing is too great to be achieved by a man who undertakes primarily to serve his fellowmen on the basis of understanding and with no limitations. (Applause.)

THE CHAIRMAN: Mr. Folks has spent so much of his own life helping the destitute and neglected and has become so conversant with the relations of bad heredity, of poverty, and of ignorance to crime and delinquency, that it isn't at all surprising that he should have found in Dr. Salmon a man after his own heart. Dr. Salmon was one

of the first of the psychiatrists in this country to emphasize to us the difference between "insane-asylum psychiatry" and what may be called "social psychiatry." He realized perhaps more than most men working in his subject the importance of the social applications of a knowledge of abnormal mental tendencies. He looked upon the failures and the misfits in life, upon the victims of poverty and upon personal inefficiency as evidences of faults of human adaptation, in other words, as psychiatric problems. Mr. Folks has told you of his unprecedented work at the immigration station. He had two great objectives there, as I understand it. One was the social objective of seeing to it that those immigrants were treated in a humane way. The other was a patriotic objective. He wanted to protect this country from the influx of large numbers of inefficient imbecile, psycho-neurotic and insane immigrants and from the entrance of criminals and delinquents.

The speakers thus far have referred to Dr. Salmon's work in civic life. We are next to hear of his relationship to the World War in Europe, one of his most important contributions to the welfare of America and of the world. Before he went over there, while he was over there and after he got back, his mind was filled with matters of *planning*. He planned how to protect the Army that was to be sent, by keeping out of it the same sort of people that he tried to keep out of this country by better immigration laws. As soon as he reached Europe, he planned and developed the Bureau for Psychiatric Service of which he was the head. Someone has said that "the neuro-psychiatric service in France was Salmon's service" and, to a very large extent, it was. He was made the chief consultant in psychiatry. When he returned to America at the end of the war, he kept ever in mind the importance of adequate care of those whose nervous systems and mental faculties had suffered injury in the War; and in the plans he made for their hospitalization, he also performed a great service.

We are going to hear something about his war work from a man who knows all about it, and, I may say, from a man of vision who, alongside of General Pershing who also deeply appreciated Dr. Salmon's efficiency, seized the opportunity of standing behind and staunchly supporting Dr. Salmon, to a large extent making his work possible and contributing to its success. Dr. Salmon had, in Europe, a difficult job entrusted to him. He couldn't have accomplished what he did without help. That help was given to him by a splendid group of medical men, on the one hand, and by a sympathetic General Staff, on the other.

Brigadier General Sanford H. Wadhams is to speak upon Dr. Salmon as "Soldier and Officer." (Applause.)

#### BRIGADIER GENERAL SANFORD H. WADHAMS

It was my very great privilege to have been associated with Colonel Salmon in France during the dramatic days of 1917 and 1918. I came to know him well and the friendship begun there continued up to the time of his death.

In June 1917 General Pershing had arrived in Paris with the vanguard of what was to become the greatest military force ever assembled under the American Flag. Immediately upon the organization of the headquarters of the American Expeditionary Forces it became my duty, under the direction of General A. E. Bradley, the Chief Surgeon, to develop and make effective a plan for the hospitalization of the American troops who were soon to be transported to France.

Owing to the fact that the Allies had taken possession of practically all buildings in France in any way suitable for hospital use, a very difficult task presented itself. The problem resolved itself into two phases: first, the securing of such buildings as might still be available and suitable

for hospitals and not yet appropriated and, second, the construction of hospitals from the meagre facilities and the small amount of material that was then obtainable in France. Any thought of shipping across building supplies had to be abandoned early. Out of this situation developed the flimsy hut hospital which later grew up in many parts of France.

Comparatively early in the development of this program, Colonel Salmon first came to Chaumont to place before the Chief Surgeon the problems that confronted him as Chief of the Division of Psychiatry of the American Expeditionary Forces. Prior to our entrance into the war Colonel Salmon had, by inspection and personal study, familiarized himself with the methods employed in both the British and French armies in caring for that numerous and very troublesome class of cases designated as the "neuro-psychiatrics."

With his habitually keen analysis of a situation, he had arrived at definite conclusions as to the methods which should be adopted in the A. E. F. I can see Dr. Salmon now as he elaborated his thoughts on this subject. He pictured the man in the trenches living a life almost beyond words to describe, and he pointed out the inevitable result to certain types of individuals of existence under such conditions. He made it very clear that the genuine victims of a war neurosis were sick men and deserved every consideration and care but that at the same time no effort must be spared to provide trained personnel who could distinguish between such cases and the malingerers. One of his early recommendations, which was later embodied in a general order, was to the effect that the use of the term "shell-shock" should be forbidden. He was convinced that by so doing the Americans would avoid what had become a serious situation with the Allies.

Almost the first of the barrack, or hut, hospitals which it had been possible to construct, was located at the little

town of LaFauche, which lay between Chaumont and Neufchateau. It was in the immediate rear of what had been designated as the American Sector, that is the so-called Verdun Sector. The completion of this hospital had been anxiously awaited by the Chief Surgeon's office in order to meet the need for a general hospital to serve the troops in the adjacent training areas. At about the time the hospital was ready to be occupied Colonel Salmon presented to the Chief Surgeon a comprehensive plan for the care of psychiatric cases which were already beginning to develop in considerable numbers in the A. E. F.

One feature, and perhaps the central feature, of his plan was to have this LaFauche hospital designated as the receiving hospital for the neuro-psychiatric cases which would originate in the zone of the army. The plan called for a staff made up of trained personnel, carefully chosen because of their knowledge and experience in handling such cases. Colonel Salmon pointed out that its location was ideal for serving the army and that any part of the front could be reached by ambulance in two hours or less. By establishing an ambulance service at the hospital the whole front area could be readily and promptly served. In other words, his plan would accomplish what he considered was absolutely essential, that is the separation of these war neuroses cases at the earliest possible moment and placing them under the care of men qualified to treat them.

Colonel Salmon's plan was so carefully thought out and so practical, and with every detail of operation foreseen and provided for, that though it meant a considerable sacrifice the Chief Surgeon approved it and the LaFauche hospital was designated as Base Hospital 117, to be used exclusively for psychiatric cases. It might be added here that the plan when put into operation was entirely successful, though attended with many difficulties which it had not been possible to foresee.

These difficulties arose very largely from the fact that after the German break-through in March of 1918, certainly one of the most critical periods of the whole war, General Pershing offered to Marshal Foch, who had just been designated as Supreme Commander, all of his Divisions which had completed their training and were ready for combat service. The result was that at this time American troops, instead of occupying the so-called American Sector, were distributed generally along the entire Western Front.

This distribution of combat troops interfered for a time with the plan so carefully thought out by Colonel Salmon and its complete operation had to be postponed until the American Divisions were once more assembled in the American Sector.

Quoting from memory, it is my recollection that of the entire number of war neuroses cases that developed in the A. E. F., slightly over fifty per cent. were returned to combat duty. In other words, these men went back to the combat organization with which they were serving at the time of the development of the neurosis. Another forty per cent. were restored sufficiently to be able to serve in the rear areas and only ten per cent. were left to be evacuated to the home country. How gratifying these results were can only be understood by comparing the figures given above with like figures of the other armies.

Everything that Colonel Salmon attempted was based on carefully worked out plans. More than that, he had the rare ability to adapt or modify his plans to make them conform with the exigencies of the military situation, a very rare quality. Loyal to his superiors, he had their respect and affection. Kindly and lovable in nature, he was able to instil in the personnel of his department from the highest to the lowest his own broad and sympathetic understanding of the mental crises which the strains and stresses of war produced in the man at the front.

The war over, he at once threw all his energy into assisting the designated governmental agency in solving the problem of the care of the large number of psychiatric cases left in its wake. The Federal Government was illy prepared to care for these men. Congress hastily decided that the care and responsibility of the disabled should devolve upon the Public Health Service. That Service, however, had practically no existing hospitals and no trained personnel to care for the mental cases. Private hospitals properly equipped and staffed did not exist. There was nothing to do, therefore, but to build from the ground up. In the meantime the disabled were accumulating in large numbers with the arrival of transports from France.

In this grave emergency Colonel Salmon placed his services at the disposal of the Government and gave freely of his time and energy as long as there were ex-service men unsupplied with proper care. Those of his friends who knew of the heavy burden he bore at this time will remember his unfailing optimism that this lack of provision for the care of the neuro-psychiatric cases would be corrected. He travelled up and down the country in prosecuting this work, spending his energy, his time and his personal means that the necessary special hospitals and the trained personnel should be made available and that these mental sufferers should have a chance for recovery, or if that were impossible decent institutional care.

Others will tell of his great contribution to medicine but to his friends of war days he will always be remembered as the friend of the soldier, particularly of those who emerged from the war wrecked in mind as well as body.

We do well to honor the memory of Colonel Salmon. In his quiet, unassuming way he carried a great burden and accomplished a great work. Those of us who came to know him well appreciate the great privilege that was ours, the privilege of living and working with a man whose



heart was brimming over with a desire to serve his fellow man. The world is distinctly a better place because Tom Salmon passed this way. (Applause.)

THE CHAIRMAN: General Wadhams has laid stress, as I felt sure he would, upon the planning habit of Dr. Salmon. It was an outstanding factor in the success of all of his work. It resulted in attacking practical problems in a scientific way—getting all the facts possible bearing upon the problems, arranging all the data that could be accumulated with regard to the problems, and then brooding over them and trying to find solutions. He had, in the war, entirely new problems to deal with, for it was a new kind of warfare. No army has ever dealt with its neuro-psychiatric problems as the American Army did in the great World War. In applying the proposed solutions, there was a good deal of prejudice to overcome at first. Indeed, there was some actual antagonism to the methods suggested. It required all the strength of Dr. Salmon's personality, and it required the loyal support of some of his good friends in the Medical Department of the Army and on the General Staff to, as we say, put his ideas across. But they were "put across," and the morale of the American Army was brought up to a higher level than would have been possible without them. Nor were these ideas and the practical results of their application without reflex influence upon the other armies of the allies!

You have just heard that a large percentage of the soldiers suffering from "war neuroses" were sent back to the fighting line very quickly. I have heard it estimated that it amounted to some ten per cent of the fighting force. That was no small contribution to the success of the war, if you will but recall the total number of men in the American Expeditionary Forces.

A Thomas W. Salmon Memorial Committee! After the untimely death of Dr. Salmon, there was a strong feeling

that the life and work of such a man should be properly commemorated. An influential Committee was formed and work was undertaken to raise funds to establish a suitable memorial. It happens that the Chairman of the Ways and Means Committee of that Thomas W. Salmon Memorial Committee knew Dr. Salmon in his very early medical work, for they served together as assistants in the Willard State Hospital some thirty years ago. Both Dr. Salmon and the man I am speaking of certainly did not conform to the popular idea of what psychiatric institutions do to the men who work in them. The idea prevails among the laymen (and I fear also among some doctors) that men who work long in insane asylums gradually become a "little queer" themselves. Dr. Salmon didn't become "queer" and the man who is next to speak didn't become "queer" either. I suppose the whole idea is false, but it is a libel that has some currency in the community. The non-official officers as well as the doctors of the Army are united in praising the common sense, the clear logic, and the pure and unalloyed sanity of Dr. Salmon.

Before we adjourn, we should like to hear in some detail of the Thomas W. Salmon Memorial Committee and its work. May I ask the Professor of Psychiatry at Cornell University, Dr. William L. Russell, for many years the Medical Superintendent of Bloomingdale Hospital, to speak upon this topic? (Applause.)

DR. WILLIAM L. RUSSELL

What I am about to present is a statement relating to the Thomas W. Salmon Memorial Committee and the Memorial.

Little more than three years have passed since Dr. Salmon was here with us, and his personality and his achievements are still vivid in our memories. This meeting is a token of the love and admiration of friends and colleagues

who knew him personally. We easily recall the charm, the clearness, the persuasiveness, and the quiet force of his personality. We saw what he did and how he did it, and we are able, in some measure, to estimate the value of his life and work to our own and to future generations.

We realize, however, that the time is coming when the name Thomas W. Salmon will not be as familiar to those who hear or see it, as it is to us, nor will it stir in them the memories, thoughts, and feelings that it arouses in us. Even his achievements, and their substantial monuments which we see so clearly, will have merged into the fabric of advancing civilization, and will be viewed without knowledge or regard of the part he played in their production. When he died so suddenly in August, 1927, his friends and colleagues, and the many others who looked to him for counsel, inspiration, and leadership, were overcome by the magnitude of the disaster. The loss to psychiatry and mental hygiene seemed irreparable. It was hard to feel reconciled to the thought that such a precious influence and power must cease to operate, and that even achievements that would continue to produce indefinitely would no longer be identified with the personality with which they were charged. To preserve in some way, and to pass on to future generations, some of the spirit and power of his life, and to apply it to the further advancement of the objects to which he was devoted, was a wish that soon became a definite purpose in the minds of his friends.

After much informal discussion, in February, 1928, this took practical form in the organization of the Thomas W. Salmon Memorial Committee. The membership of this Committee consists of over 200 of his friends and colleagues in different parts of the country. Three-fourths of the members are physicians. It was expected that the fund that would be required for the establishment of a memorial would, for the most part, be contributed by the

members of the Committee, and by other personal friends, colleagues, associates in organized work, and others who had become attached to Dr. Salmon as a counsellor and aid in their personal and other problems. It was felt that the amount obtained from these sources, whether large or small, would be a tribute of sincere love and of genuine sympathy with the purposes in view, and would be in keeping with Dr. Salmon's preferences.

Much thought and discussion were given to various forms of memorial that were suggested. All agreed that it must be something that would, in his name, contribute to the advancement of psychiatry and mental hygiene. After much consideration it was finally decided that, for the amount that could probably be secured, nothing that had been proposed would so well serve the purpose as a lecture or a series of lectures, on an independent foundation, to be given annually under the auspices of some scientific organization, and not restricted by the requirements of a formal educational system or curriculum. It was felt that the spoken and written word, which is such a mighty power in human relations and in the advancement of civilization, would be a living memorial, with a vitality, and with a capacity for continuing influence under changing conditions. In other branches of medicine and in other sciences, lectures under similar auspices have long had a place of honor and usefulness. Psychiatry and Mental Hygiene have not been so provided and it seemed fitting that the first to be established should be in the name of this distinguished pioneer. The Salmon Lectures would furnish a means of presenting communications of special distinction and value. They would also provide an opportunity for sometimes reviewing, for the benefit of the students and workers of the period, the character of Dr. Salmon's life and work. It was anticipated, also, that the lectures would be regularly published in book form, and that a growing row of volumes, each with a prefatory account

of the origin and purpose of the lectures, would, in many libraries, provide a widely distributed, permanent memorial.

Having thus decided, the Committee after a considerable period of further organization and of preparation for financing the project, in May, 1929, issued its appeal for contributions. The expense of the appeal was borne by a group of Dr. Salmon's more intimate friends. The response was so prompt, so enthusiastic, and so liberal, that it was in itself a striking tribute to the esteem in which he was held. It also revealed that a project of greater magnitude could probably have been accomplished. The Committee, however, is satisfied, that the lecture scheme will provide a dignified and altogether appropriate memorial, and will serve some of Dr. Salmon's deepest wishes. The appeal called for a minimum sum of \$100,000 which was considered sufficient to provide an annual income adequate for the expense of a series of lectures and their publication. It was thought that, if a larger amount were subscribed, some other projects which were favorably considered by the Committee might also be financed, and this we hope may be possible. The number of contributors to the fund is 596. Contributions were received from residents of 31 states and of two foreign countries; 319 of the contributors are physicians. Contributions as small as one dollar were received, and a few, one from a Foundation, were quite large. Whether large or small, however, every contribution was clearly a token of affection and of a strong desire to convey to future generations something of the spirit and purpose of Dr. Salmon's life and work.

Before appealing for contributions, the Committee considered it advisable to make provision for the permanent establishment and administration of the lectures, and to announce this with the appeal. It was believed that they would be best administered by some established scientific organization of high standing. It seemed fitting that this

should be a medical organization. Dr. Salmon was pre-eminently a physician, both in the specific sense, and in the broader meaning of the word—a natural philosopher. The fundamental aim and purpose of his life was the art of healing. It may be said that he was born into it. His father was a physician, and the life and work of a village doctor, and the experiences and problems met with in his practice, were no doubt familiar to Dr. Salmon from his earliest years. We may conjecture, from knowing Salmon, that his father was a follower of the best ideals and traditions of the profession. This, and the ideals and traditions derived from the generations during which the family lived in the Shakespeare country of England, were a heritage which may, in some measure, account for the intellectual clearness, the vivid imagination, the fine sensibility, the chivalry, and the spiritual quality which so distinguished Dr. Salmon's personality. He began his own professional career as a village doctor and he would have been happy to continue in that field of practice. His fortunate advent into psychiatry and mental hygiene was due to circumstances, in which his principal contribution was his extraordinary insight into the problems of this field and the ability which he displayed in dealing with them as opportunity was presented to him. Notwithstanding, however, his interest and remarkable success in organized work, in which he was removed from the direct relations of physician and patient, he never ceased to retain the point of view and the feeling of the practicing physician. In every undertaking the vision of the sick man to be relieved was his guiding star. This did much to determine the quality and extent of the success which attended his efforts. In every phase of his career he made notable contributions to the relief of the sick. The psychopathic pavilion at Ellis Island, the hospital ship for the fishermen at sea, the form and methods of organization for war service, the psychiatric hospitals for disabled ex-service men, the State Psychiatric Institute at the Columbia Medical

Center, and the many improvements in the treatment of the mentally sick everywhere, which he brought about, all bear witness to this controlling purpose of his life. His deepest desire was to work directly with patients, and when he felt free to return to active medical practice he was filled with joy. It is pleasant to think that he was given this satisfaction in the last years of his life. It seemed, therefore, to the Committee, that it was peculiarly fitting that the Salmon Lectures should be under the control and management of a medical organization, and that they should be fundamentally medical in character and aim.

It was also thought that a New York organization should be preferred. Dr. Salmon was a New Yorker by birth and residence. He did, indeed, become a national figure, and many of his activities and achievements were national in scope. New York was, however, his headquarters and his home, and his most intimate relationships were there. It was thought that the administration of the lectures by a New York organization would not necessarily require that they be confined entirely to New York. One or more of them might, and no doubt will, in any year, be given in other places. The lecturers might, and no doubt will, be selected from any part of the country or from other countries, and it was believed that the lectures would be of such a character that it would be a distinction to be selected. The Committee felt that what was most important was to entrust the administration to a medical organization, the standards and policies of which could be depended upon to maintain the lectures at the high level required for the accomplishment of the purposes for which they were established. After careful consideration, it was unanimously agreed that none was superior to the New York Academy of Medicine, and that it was the organization to be preferred if it would accept the trust. Its high standing since its foundation in 1847, not only in New

York, but in the medical profession everywhere, its distinguished membership from every branch of medicine, its permanent endowed administrative establishment, the breadth and freedom of its policies and activities, seemed to mark it as an institution in which the lectures would reach their highest usefulness. As he was a Fellow of the Academy, it was believed that special interest would be felt in cherishing and honoring Dr. Salmon's memory. It was thought that under the auspices of the Academy, the lectures would be administered with reference to interesting and informing the whole medical profession rather than one branch of it. To muster into the service of the aims of psychiatry and mental hygiene the whole body of medical practitioners was one of Dr. Salmon's fondest wishes. He believed, too, that better understanding and coöperation between psychiatry and the other branches of medicine should be accomplished, and it was his intention to make this, to which he had already made substantial contributions, one of his main tasks during the rest of his life. It was decided, therefore, to make application to the Academy. The Committee was much gratified when, after careful consideration, the Council of the Academy accepted the proposal. This was announced in the appeal, and no doubt contributed materially to establishing confidence in the project and to securing support for it.

The main purpose of the Thomas W. Salmon Memorial Committee has now been accomplished. The minimum sum which was considered necessary has been secured, and this meeting marks the inauguration of the Salmon Lectures. As Chairman of the Committee, I beg to congratulate the members on the success of their undertaking, and, to thank those, who, whether members or not, have by their interest and generous contributions, made this happy conclusion possible. We are especially happy that the New York Academy of Medicine is to administer the lectures. Dr. Salmon hoped much for human welfare from a better



understanding and a closer coöperation between psychiatry and the other branches of medicine. In one of his addresses he spoke of Psychiatry as the neglected step-daughter of Medicine, whom a fairy prince named Science was about to elevate to a place of honor and greater usefulness in the family. There could be no better place for this happy consummation than the Academy, which is a home of Medical Science, where the leading spirits of every branch of medicine meet. Under its auspices, the Salmon Memorial will, we feel sure, be cherished, and applied as he would have it, to be a light to help illumine the dark places of the mind.

LADIES AND GENTLEMEN: It is now my privilege to present to the Academy the fund for the establishment of the memorial.

*Mr. President: Dr. Hartwell.* I have been instructed by the Thomas W. Salmon Memorial Committee to place in your hands this fund of \$100,000, together with a list of those by whom it has been contributed. The fund is dedicated to the service of Science and Humanity, and is presented by the Committee to the New York Academy of Medicine to be administered to this end as a memorial in honor of the singularly beautiful and productive life of a distinguished physician and Fellow of the Academy, Dr. Thomas W. Salmon. (Applause.)

DR. JOHN A. HARTWELL

Dr. Russell, in accepting this, the Academy does it with a deep sense of appreciation of what it recognizes to be an honor that has been conferred upon it. The Committee, after very careful consideration, decided that the Academy of Medicine is the proper body to undertake this work. That is, of course, a matter of great satisfaction to the Council of the Academy and to its fellowship. It is also with a deep sense of responsibility that the

Academy undertakes the administration of this fund. It is hardly necessary to tell this audience, or to repeat to this audience, after what you have heard tonight, why the Academy feels that responsibility.

I presume a large number of you knew Dr. Salmon personally. Those of you who did not, know of his work and cannot but be impressed by what he stood for and what his life has already meant and what it will continue to mean. He was a Fellow of this Academy, a very much beloved Fellow. The field in which he worked, as Dr. Casamajor said, was to show the medical profession as a teacher that psychiatry was not a narrow specialty of medicine, but that it was something that entered into the daily life of every physician in his daily work and in association with his patients. In doing that, Dr. Salmon was a great artist and a great physician.

Therefore, it is with deep appreciation and a deep sense of responsibility, Dr. Russell, that the Academy accepts this fund and will do its best to administer it in such a way that the ideals which Dr. Salmon stood for, and which have been so splendidly spoken of here this evening, shall continue to prevail and that his life shall go on as an example and a force in carrying through the great work he inaugurated. (Applause.)

THE CHAIRMAN: It would seem that Columbia University and Cornell University are vieing with one another to do honor to Dr. Salmon's memory tonight. The Professor of Neurology at Columbia has paid his homage. The Professor of Psychiatry at Cornell has presented this memorial to the New York Academy of Medicine whose President, Dr. John A. Hartwell, has been Professor of Surgery at Cornell for many years. In order to make things even, the Committee has asked another representative of Columbia to make an announcement regarding the choice of the first lecturer on the Thomas W. Salmon Me-

morial Foundation. The announcement will be made by one who is himself a distinguished organizer, and who has shown his capacity for good work in connection with the Red Cross in France and with the organization of the Columbia Medical Center. I call upon Dr. C. C. Burlingame to make the announcement. (Applause.)

DR. C. C. BURLINGAME

The Thomas W. Salmon Committee of the New York Academy of Medicine, acting under the terms of the agreement under which these funds were accepted by the Academy, have selected for the first award under the Salmon Memorial and as the man who is to give the Thomas W. Salmon Lectures during the year 1931, Dr. Adolf Meyer, Professor of Psychiatry of Johns Hopkins University and Director of the Henry Phipps Psychiatric Clinic of Johns Hopkins Hospital.

Dr. Meyer is outstanding among the psychiatrists of the world, and as a psychiatrist, a leader in the fields of anatomy, neurology, psychiatry and psycho-biology.

A teacher from his earliest days in the United States, his influence on psychiatry expressed through his pupils is well known abroad. Conservative and sound, but with broad vision, at all times in contact with his own research laboratories, he has for many years given a powerful stimulus to the building up and development of a "dynamic," progressive psychiatry.

Not generally known, however, is the fact that Dr. Meyer is the man who first suggested and first used the term "Mental Hygiene" and by that very naming gave to this great movement its initial impetus and a forward-looking comprehensive program. He has been identified with the movement from the day he named it and was one of the original organizers of the National Committee for Mental Hygiene.

A leader in the related field of the social sciences, Dr. Meyer is at the present time engaged in the work of integrating the several sciences upon which mental hygiene and psychiatry are built, to the further advancement of this branch of medicine.

Dr. Hartwell, to you, President of the Academy, it is my privilege and pleasure in behalf of the committee to report this action. (Applause.)

#### ADJOURNMENT

## THOMAS W. SALMON

1876—1927

### A TRIBUTE\*

THOMAS WILLIAM SALMON, M.D., 1876-1927. A prince among men, a sweet spirit, a helpmate of every lame and halting mind, Tom Salmon, the wise physician, left us without his peer in a way of life which might well become a new cult or form of religious faith for the great company of his friends, his followers, his patients, if it were not the very essence of Christian living.

The peace and distinction of his parents' birthplace—Stratford-on-Avon—descended upon their son, and the tradition from his father of the healing art was held by our Dr. Salmon of the new world, as a trust worthy of all that the motherland has meant to our country.

The inheritance of the gift of teaching came to him through his elder generations, and though the record of rapid events and pursuits in his own youth show him as a school teacher for two years, his later audience was universal, and in a sense eternal since his every thought and expression led all who were with him, or read his words, upward to higher, happier levels of life.

He touched nothing in his years of constant effort which he did not illuminate with his shrewd insight, his clarity of expression, his logical and courageous plan of action to bring results.

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\* Delivered by Dr. Haven Emerson at the 18th annual meeting of The National Committee for Mental Hygiene, held on November 10th, 1927, in New York City.

Inertia of the public, of bureaucracies, of ignorance, challenged his powers in proportion to their bulk and their offense to human needs.

He wove his thread of golden deeds from hospital to hospital, from state to state, from nation to nation, beyond the seas and back again, following the meanders of the maimed and doubting minds until he could secure for each handicapped one all the measure of relief they were capable of.

He was a bulwark against the rising flood of guests who were already, to his discerning eye, unfit to share in the social privileges of our country.

Epidemiologist of note, statistician of broad imagination and rigorous precision, standard bearer of honest terms, counsellor of legislators, he carried a gospel of truth to the furthest, darkest, saddest counties of our continent and by his lantern showed the way to a fairer treatment of mankind by fellow men.

Honors to him were but commissions from the world at large to gird himself for ever greater crusades, with loftier and more enduring objectives.

He was a ferment, a catalyst releasing powers and acts of influence, far beyond the realization of those he swept with him from one field of conquest to the next, from solution to solution of hitherto insoluble difficulties, and on to the crystallization of new concepts which made the world of human thought seem simpler, sweeter and more secure.

To have seen him mothering and fathering, judging and saving, his brothers in the A. E. F. was an experience in exaltation. Nothing which was needed was impossible of attainment.

He could not be denied, for he never asked his government, his friends, his profession for anything for himself.

His was the humility of a beautiful faith in the power of wisdom, of fair dealing, of honesty, of clear thinking and frank speech to unlock the prisons of injustice, and to create new temples of the soul.

If it is in the province of preventive medicine to provide a more beautiful tabernacle for the spirit of man to inhabit, Thomas Salmon did greatly enlarge and liberate the spirit of man.

To have been privileged to share his friendship, to have been trusted with some part in the salvaging of our fellows, as he called upon us—these are precious memories.

His cruise into the unknown at last, and so swiftly, and so far too soon, leaves us to prove we are worthy of his confidence by devotion all the more convinced to the emancipation of the mind of man.

# BULLETIN OF THE NEW YORK ACADEMY OF MEDICINE

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## EDITORIAL

### AN EPITOME OF THE HISTORY OF SPANISH MEDICINE.<sup>1</sup>

The status of Spanish medicine, as of Spain itself, in relation to Europe, turns upon the physical geography of the country, its peculiar isolation by sea and Pyrenean mountain-walls, and the isolation of its different provinces from one another by physical barriers of the same kind. Apart from the work of the great histologist Ramón y Cajal, Spain has left no appreciable mark upon European medicine, no such influence (shall we say) as that of Spanish fiction upon the French and English novel of the 17th-18th Centuries, of Calderon upon Shelley, of Velázquez upon Whistler or of Goya upon the whole range of recent fantastic and realistic art. Yet, during her Golden Age (1516-1700), Spain was one of the greatest colonizers the world has known, in Velázquez she produced the greatest painter who ever lived, and, as we shall see, her output in medicine during 1500-1700 holds its own with any other European country except Italy in the 16th Century and England in the 17th. Taken by and large, the medicine of Spain was, and still is, virtually the medicine of South America, Mexico, Central America, the Antilles, the Philippines, Portugal, Goa and parts of North Africa. In her power to assimilate native races to herself, Spain was a more efficient colonizer than Rome or England, actually getting inside their skins and making them Spanish at heart and in

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<sup>1</sup>From the Institute of History of Medicine, Johns Hopkins University, Baltimore, Md. Direction of Professor William H. Welch.



modes of thought. Rome, England, Prussia could impose laws and uphold government, but Rome could not change the essential nature of the Gaul, the Teuton, the North African or the Jew; England could not make Englishmen out of Hindus or Australian aborigines, nor could Spain, in the days of her might, turn Neapolitans and Sicilians into Spaniards. Her influence upon native races was more pervasive and intangible, like that of the Greeks upon the peoples of Egypt or of the littoral of Asia Minor. When Blasco Ibañez asserted that Spain has no further need of colonies, since their peoples have all become her spiritual children, the assertion met with no particular comment, for all recognize it to be the truth.

The history of Spain and of Spanish medicine goes back to palæolithic times. The Iberian peninsula, surrounded by the Atlantic and the Mediterranean and shut off from France by the Pyrenees, was once continuous with Africa, and, as some enthusiasts conjecture, even with America. From the heights of Castile and Estremadura falls a slope which is abrupt toward the Mediterranean, gentle toward the Western ocean. These gradients are criss-crossed by smaller cordilleras and plateaus, separating Spain from Portugal, old Castile from New Castile, Castile and Estremadura from Andalusia, while Aragon, Catalonia, Valencia and part of La Mancha form the narrow littoral on the Mediterranean (Northern) coast. The valley of the Ebro lies in Aragon and Catalonia and between the Ebro and the Guadalquivir is a tableland of huge dimensions. Over this well ridged and well-rivered peninsula, there passed, in due process of time, the usual succession of domineering or dominating races—Iberians, Celts, Phœnicians, Visigoths, Romans, Moslems, with constant insurrection of groups of subjugated peoples, with natural coalition of adjacent kingdoms or the inevitable secession from such mergers, until finally the Moslem yoke is thrown off and Spain stands forth as an independent, individualized nation, through the union of Castile and Aragon under Ferdinand and Isabella in 1479. So England was formed out of the Saxon heptarchies, so modern France, Italy and

Russia were formed, so the Germany of 1870 was formed and so our own country was federalized and unified after 1865. In the view of Humboldt, the initial primitive Celt-Iberian stock was autochthonous, aboriginal, of the soil. In the view of Leibnitz, Niebuhr and Haeckel, they were a Hamitic-Semitic race of North African origin, *colorati rultus et torsi plerumque crines*, like the Sicilians in Tacitus. The longish skulls, the similarity in language and primitive tribal organization, point to a close relationship with the Berbers, Tonaregs, Copts and Kabyles of the North African littoral and desert. The Spanish Basques west of the Pyrenees are dolichocephalic; the French Basques brachycephalic. The Tonareg suffix *tani* is common to the Roman geographical designations Lusitania (Portugal), Gaditania (Cadiz), Mauritania and, as stated, the Iberian peninsula was once continuous with Africa Minor. The carvings, rude line engravings and mural paintings of this prehistoric Afro-Semitic race constitute the finest and most instructive survival known to us of palaeolithic art. In the caverns of Cogul (Lerida), Alpera (Albacete) and Almeria are fresco paintings and etchings on stone or bone, which are so accurate and realistic that the animals are identifiable as to species and the human figures are perceived to be almost identical as to costume and physical habitus with those of Crete. As in the case of Egypt, this strong grip upon reality vanishes in the neolithic art of Spain, which is decadent and remarkable only in respect of decorative pattern work and ornamentation.<sup>2</sup> The primitive inhabitants, both of Spain and the Canary Islands, were indubitably of the Crô-Magnon type. There is no evidence of the existence of Neanderthal Man. The West and the Northwest (Galicia and Portugal) was settled by the Celts, the Iberians occupying Eastern and Southern Spain, while in the center the Celt-Iberian mix-

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<sup>2</sup>The observation of anthropologists is to the effect that palaeolithic art, like that of the savage, the child and the insane, is animistic, ideographic and realistic, while the inevitable tendency of neolithic art toward pattern work and formal, but lifeless perfection, is a natural consequence of development of the science of measurement, e. g. in the designs of pottery, textiles, architecture and other metric and geometric arts.

ture came to pass. The provinces, such as Lusitania or Galicia, were local federations of 30-40 tribal groups. The Phœnicians came into Spain in the 11th Century B. C., attracted by the mineral wealth (silver, copper, mercury). They called the peninsula *Span* or *Spania* (the hidden land). The Greeks came in on the northeastern coast (630 B. C.) and have left the earliest accounts of the country (6th Century B. C.). The Carthaginians came in on the eastern seaboard a century later. During 236-206 B. C., Spain was in the hands of the *Barca gens*. Hamilcar Barca gave his name to Barcelona, on the northeastern coast, while his son-in-law, Hasdrubal left another mark of Carthaginian occupation further south, in the name of the capital, Cartagena. In 206 B. C., the Carthaginians were ousted by the younger Scipio and the Romans occupied Spain during the next six centuries (206 B. C.-409 A. D.). They left their mark in better laws, better administration, in the remains of the great walls, public works, amphitheatres and aqueducts (Segovia, Tarragona), in the structure and etymology of the Spanish language,<sup>3</sup> in the well-made military roads, in the expansion of commerce, in long periods of peace which insured the growth of wealth and culture, and in the development of the best type of citizenship. Some of the mildest and greatest of the Roman emperors, Trajan, Hadrian,<sup>4</sup> Theodosius, were all of them born at Italica, near Seville, and Marcus Aurelius was of Spanish descent. Augustus Caesar, who put his Spanish freedman, Hyginus, in charge of the Palatine Library, was once at Tarragona, where he was cured of a liver complaint by Antonius Musa. To the Roman literature, Spain contributed Martial, Lucan, Quintilian, the Senecas, Columella, Pomponius Mela and Juvenecus. Among the medical men, the anatomists Mustio and Vinician and the physicians Cassius Felix, Theodorus Priscianus and Caelius Aurelianus were Numidians or "little

<sup>3</sup>Thus Zaragoza derives from *Caesaria Augusta*, Merida from *Emerita Augusta*, Badajoz from *Pax Augusta*, Astorga from *Asturica Augusta*, León from *Urbs Septima Legionis*, etc.

<sup>4</sup>Author of the *Animula vagula blandula* verses.

Africans" (from Africa Minor). By the 3rd Century A. D., there were many Christian communities in Roman Spain. St. Damasus (304-384), thirty-sixth in the line of Roman pontiffs, who inspired St. Jerome to translate the Bible, was of Spanish origin. Prudentius and Orosius came from Tarragona, Priscillian from Cordova, Theodolphus, author of the Palm Sunday *Gloria*, was Spanish born, and several martyrs of the Church, such as San Vicente of Valencia, Santa Eulalia of Merida, San Severo of Barcelona, Santa Leocadia of Toledo and Santa Engracia of Zaragoza, were put to death under Diocletian. At the beginning of the 5th Century, A. D., the Vandals swarmed into Spain to occupy Andalusia (Vandalusia or Vandal-Land) and were followed by the Visigoths, who dominated the country for three centuries (409-713). The principal relic of their occupation is the Visigothic Code (*leges barbarorum*), which contains certain rigorous prescriptions touching medical fees, punishment for malpractice and the reciprocal rights of physician and patients, not unlike those in the Code Hamurabi. The Visigothic Code was later combined with certain juridical principles enunciated by Isidore of Seville, to form the Spanish Magna Charta (*Fuero Juzgo*). The Romans held on until the Visigothic King Theodoric made a definite split with the Western Empire in 476. Toledo became the Visigothic capital during the reign of Athanagild (554-567) and about 587-589, the Visigoths were converted to Catholic Christianity. In the 6th Century, a Cæsarean section was performed by Bishop Paul of Merida (530-560) and a hospital was founded in the same city by Bishop Masona in 580. The most important figure among the Spanish clergy was Archbishop **Isidore of Seville** (570-636), whose statue stands in front of the National Library at Madrid beside that of Alphonso the Wise, and whom Sndhoff defines as "the true stepping stone to Spanish science and medicine in the Middle Ages." Like Cassiodorus and Boethius, Isidore was a man of vast learning, author of an universal history, a history of the Visigoths, Vandals and Suevians, lives of illustrious men, and the *Etymologia*, or encyclopædia of origins and ety.

mologies, which sums up all the knowledge of antiquity. The fourth book is devoted to medicine and derivations of medical terms. To the *Fuero Juzgo* or Spanish Charter, (*Forum Judicium*), Isidore contributed the doctrines of the divine right and hereditary succession of kings and the duty of the State to protect the Church, as the best means of insuring peace and tranquility in these troublous times.

During the long period of Moslem domination (711-1276), there was constant warfare, but the intervals of peace were far more frequent than during the period of struggle for national unity (1276-1479) and in these intervals, Christian, Moslem and Jew managed to subsist side by side without any apparent friction, like the wild animals at railhead in Uganda. The unitarian, standardizing mania of Islam was, in theory, at least, a species of theological Sovietism, but the real object of the emirs was conquest as a pathway to pleasure, with monotheism as a stalking horse. The Arabs themselves were sceptical, materialistic, indifferent, pleasure-loving, polygamous, sometimes atheistic, fonder of music, dancing and erotic poetry than of orthodoxy and devotion. Like all converts to a creed or a social code, the Berbers and other North African tribesmen were inevitably more fanatical than those born and bred in the faith. Arab military expeditions were usually forays for plunder and once the booty was secured, religious toleration was the rule. Christians acclimated to Moslem rule (Mozarabs), Moslems living under Christianity (Mudéjares) and Jews were, in fact, better treated by Islam than were the converted Jews (Maranos) and converted Moslems (Moriscos) under Christianity in the later period. Christian and Moslem observed the same holy days, and, in one instance, worshipped in separate halves of the same church. The Jews, under stress of the Visigothic penal code, went over to the Arabs, and became prime movers in the intellectual predominance of Cordova and Toledo. Again, the Arabic community was always tribal (*taifa*), sometimes nomadic. Alliances and allegiances were impermanent, often fitful and irresponsible. The whim of joining up with one's enemies, to help

them out in a tight place or against some hated rival, was as common to Christian or Moslem chieftains as it is to "the indifferent children of the earth" today. Ruy Diaz, far from being the noble, impeccable Christian warrior of tradition, ever crusading against the Paynim, was actually banished from Castile by Alphonso VI for theft of funds, sold himself on occasion to any highest bidder, got his romantic title of Cid (Lord and Master) from his Moslem employers, and, in 1086, appeared with a mixed horde of Christians and Moslems to dispossess the Moslem overlord of Valencia. When Ferdinand II (San Fernando) of Castile was invited by Louis XI to join the Crusades, he replied: "There are plenty of Moors in my own country." Single-minded fanaticism was confined to the Almoravides (religious men) or Berber converts of the Sahara, and to their opponents, the Almohades or unitarian Moors of Morocco. Under the tolerant Arab sway, literature, art, science and philosophy were permitted to flourish, hospitals and libraries were built, schools and scientific societies were founded, agriculture and industry were organized, and by the 10th Century, when the nomads became sessile and stabilized, Moslem Spain, and its capital Cordova, were credited with untold wealth. Apart from the mathematics and polite literature, the Moslems were assimilators and transmitters rather than innovators. Their architecture (domes and decorated flat surfaces) derived from Byzantium. The *patio* or enclosed court of their houses came from Rome. Their medicine was but a diluted or debased strain of Greek medicine. The Moslems were, nevertheless, the principal transmitters of ancient Greek and Byzantine Greek culture. The handy Arabic numerals made arithmetic (algorithms) possible, the Moslems forwarded algebra as well as the Egyptian tradition of chemistry (alchemy) and one of their great physicians, Avicenna, was the founder of geology. To the comforts and luxuries of life the Arabs added cultivated plants and drugs, spices and perfumes, gardens, street-lamps, window-panes, fireworks, under-garments, morning and evening serenades with stringed instruments. The

great physicians of the Western Caliphate (655-1236)—Albucasis, Avenzoar, Averroes and Moses Maimonides—were all born at (or near) Cordova, but they are regarded by the Spanish historians as part and parcel of Islam or Israel, not germane or essential to the development of Spanish medicine in the Age of Gold. Beyond a few, fugitive and fragmentary strains of Mozarabic melody, monotonous and fitful as the crooning of a negress at a clothes-line, the Moslems left no appreciable influence on the national music of Spain, which is *sui generis*. One of these Mozarabic chanties, *Qualbi qualb' Arabi qualb' Arabi* ("My heart is the heart of an Arab") suggests the fact that the nomad warriors of the desert did not, like the Visigoths, bring their families with them and so intermarried freely with the Christian women. The main area of this racial inmixture of Celtiberic, Visigothic and Afro-Semitic strains was Andalusia (at the South) and through the fact that the Spanish colonization of the Western Hemisphere was accomplished mainly by Andalusians, sailing from the convenient ports of Cadiz and Seville, the effect of this Arabic racial ply upon national character was to be most decisive among the peoples of the New World.

To the North of the Cordovan Caliphate, which, during 910-1037, embraced most of the Iberian peninsula, lay the Visigothic kingdoms of Asturias, Leon, Castile, Navarre and Catalonia (Barcelona) and of these, the mountainous border state of Asturias was the center of continual revolt from the Moslem yoke from the start. The frontier was South of the Douro River and Aragon was in the enemy domain. By 1150, this frontier has been pushed southward to the Tagus River and by 1276, all that remained of Moslem Spain was the tiny seaboard kingdom of Granada, facing Africa. The Catalans on the northeastern coast, like their forebears, the Carthaginians, are the natural business people of Spain, and have been in continual revolt against constituted authority from the earliest times. The recent revolution (1931) and their part in it, was inevitable and not surprising.

In the long struggle for a united, independent Spain, the Benedictine monks of Cluny, who came into Castile in 1033, were an important agency in activating the Catholic monarchs to the task of reconquest. There is no evidence extant of charitable medical aid in the Spanish medical cloisters before the advent of these Benedictines, who were the special creation of Charlemagne himself. In the cloister of Victoria and Emilia, there were books of medical recipes, like those of Western Europe in the 8th-9th Centuries, the oldest of these coming from the Pyrenean cloister of Ripoll, near Gerona, which was founded in 820 and existed up to the beginning of the 19th Century. Some two-thirds of these MSS. were found by Sudhoff<sup>5</sup> to be in the Royal Aragonese Archives at Barcelona. The oldest is a codex of the 8th-9th Century, comprising a recipe book, with therapeutic applications at the top of the page, an *Antidotarius* (collection of magistral formulæ) and a *Passionarius* (descriptions of diseases), with sundry Salernitan estrays. Some decades before the enfranchisement of the Ebro Valley, Toledo was already under home rule (1085). Its mosque was full of costly Arabic MSS. and it was soon to eclipse Cordova itself in medicine, philosophy and theology and as a center of social life. Here, then was the natural clearing house for Latin translations of the Arabized Greek texts of the Moors, of which the best came from Irak. The Latin paraphrase of the hygienic epistle of pseudo-Aristotle to Alexander by the Marano, Ibn Dawud or **John of Toledo**, became widely known all over the West and was dedicated to Princess Tharasea, daughter of Alphonso VI. About 1180, this fragment, enucleated from the *Secreta* of Aristotle, became the original of the *Regimen sanitatis* of Salerno. At this time, as shown by Steinschneider,<sup>6</sup> the Jews were the natural interpreters in these translating activities and the

<sup>5</sup>See his inventory of the MS. literature in *Spanische Forschungen d. Görres-Gesellschaft*. Münster i. Westfalen, 1930, II, 178-184.

<sup>6</sup>M. Steinschneider: *Die hebräischen Uebersetzungen des Mittelalters und die Juden als Dolmetscher*. 2 v. Berlin, 1893. *Die europäischen Uebersetzungen aus dem Arabischen*. Vienna, 1904-5.



Mozarabs were as helpful as the Jews. Arabic was actually spoken by learned Spanish Jews up to the 13th Century. This translating movement at Toledo, fostered by Archbishop Raimundo, Archdeacon Gondisalvo and others, eventually centered around Gerard of Cremona (1114-87), who came there from Italy to get a translation of Ptolemy's *Almagest* and thus started a school of translators which was active to the end of his life. Of 71 books translated under Gerard's direction, 28 were medical. Gerard is also said to have lectured in the Capilla de la Trinidad of the former Mesquita, but there is no evidence to this effect nor is any surviving MS. of Gerard to be found in the Biblioteca capitolar (Sudhoff). About 1212-14, Alphonso VIII of Castile founded the first Spanish university at Palencia, where a hospital had been established by the Cid in 1067. The University of Salamanca was founded by Alphonso IX of León in 1215, but not confirmed until 1243 (by Ferdinand III and later by a Papal bull of 1255). Universities were also planned at Lerida (1300) by Jaime II, at Valladolid (1346) and at Huesca (1354). In 1255, Alfonso X (the Wise) obtained from Alexander IV a bull founding an Academy of Medicine, at which Cordovan and Toledan physicians gave instruction based on the *Canon* of Avicenna and the *Colliget* of Averroes.

In the 12th Century, refuges were founded in Zaragoza for pilgrims, sick people and lepers. Similar institutions followed in many other cities. The leading medical figures of the time were the alchemist Ramon **Lull** (1235-1315) of Mallorca, who left an unpublished *Ars medicinae*, with astrological figures, now in the Library of the Escorial; **Arnold of Villanova** (1235-1315) of Catalonia, who wrote the famous commentary on the *Regimen Sanitatis* of Salerno, and Pope John XXI (**Petrus Hispanus**), who wrote on medicine (*Thesaurus pauperum*) and came to a tragic end at Viterbo in 1277. Sudhoff<sup>7</sup> states that the great Salernitan surgeon Theodoric, pupil of Hugh of

<sup>7</sup>Sudhoff: *op. cit.*

Lucca, may also have been a Catalan. Jean **Jasme** de Agramont (Johannes Jacobi) of Lerida wrote a pest tract in the Catalan dialect (1348), which bears some relation to the incunable of Johannes Jacobi or (Canutus) Klebs. Micer Johan, author of a *Llibre de receptes* was probably Juan de Valencia, physician to Alphonso I. A fragment of a medical MS. of 1381 by Estefano, physician to Bishop Don Pedro of Seville, is in Madrid (Sudhoff). Raimondo de **Sabunde** [ -1432], of Barcelona, professor of medicine at Toulouse, was the author of *De natura hominis* (Cologne, 1501) and of a defense of Christian doctrine (*Theologia naturalis*), which Montaigne translated (1569) and defended in one of his Essays (II, 12).

#### THE FIFTEENTH CENTURY.

The period of struggle for national unity (1252-1479) was characterized by the ascendancy of towns and town life, the inevitable struggle between the principle of unification (vested in the King) and the decentralisation implied by the growth of power in towns and among the nobility, who, then as later, were "rich men" (*ricos hombres*) possessing broad estates (*latifundia*). The chief agents in this policy were Alphonso X (1252-84) called the Wise, and his great grandson Alphonso XI (1352-84). By the end of the 15th Century, the weak rulers who preceded Ferdinand and Isabella were apparently defeated, but, in reality, the power of the nobles was destroyed and monarchy was triumphant. At the same time, more power had been gained by the legislative bodies (*Cortes*) and the officialdom (*adelantados*) of the different capitals, and such Moorish survivals as the civil marriage (*á yurgas*) and the common law or bargain marriage (*barraganía*) were giving way to marriage by religious sanction (*benedición*). The legal obligation of proving that one's progenitors had no taint of Moorish, Jewish, heretic or infidel blood (*limpieza de sangre*) was not abolished until 1835.

During the 15th Century, **universities** were founded at Barcelona (1450), Zaragoza (1474), Mallorca (1483) and

Alcalá de Henares (1499), which, as being near Madrid, soon became a rival of Salamanca itself. It was richly endowed by Cardinal Ximenez in 1510, and three centuries later, was merged into the University of Madrid. In 1422, Juan II created a Tribunal of Alcaldes and Examiners to ascertain the competence of applicants for the right to practice medicine. The duty of examining physicians and surgeons to the king and the nobility was assigned to *protomedici*, of whom Alfonso Chirino and later Fernan Gómez were the first. These privileges of the "Protomedicate," dating from 1422, were confirmed by a law of March 30, 1477. So great were the privileges accorded physicians that they were protested against by the Cortes at Zamora (1432) and Madrigal (1438), but nevertheless reaffirmed by royal ordinances of 1435 and 1438, in virtue of which, no civilian or other authority could interfere with the business of the Protomedicate Tribunal. Spanish physicians, in fact, had a special tribunal of justice of their own from the start (1422), while the Royal Councils and Chancelleries of Valladolid, Madrid and Granada were not created until 1442, 1494 and 1505 respectively, the Council for the Indies in 1511 and the Tribunal of the Inquisition in 1483. **Insane asylums** (*casas de orates*) were founded at Valencia (1500), Zaragoza (1425), Seville (1436) and Toledo (1473). During the epidemic of plague in 1474, quarantine was established at Mallorca. Leper houses were established in great numbers and under direction of special officials (*alcaldes de lepra*). In 1240, Ferdinand III established a chair of **anatomy** in the University of Palencia, which was transferred to Salamanca by Alphonso the Wise. Dissection was done outside the city limits, usually in cemeteries. But progress in anatomy was not great and the physiology of the period was entirely Arabist. **Surgery** was in the hands of barbers, and Salamanca students practiced bandaging upon an articulated mannikin up to 1490, when Antonio Amiguet and Juan Vals established a school for technical instruction in surgery. The only text of consequence was a kind of hornbook of surgery in

rhyme (*Cirurgia rimada*) by Diego Cobo (1412). Military surgery was forwarded by the service of **camp hospitals** and **ambulances** instituted by Queen Isabella during the expulsion of the Moors from Granada. Six large hospital tents were in evidence at the siege of Alora (1484) and four at the siege of Baza (1489). Wagons provided with beds appeared at the siege of Otrera (1477-8) and no less than 400 of these ambulances were employed after the capture of Malaga (August 19, 1487), as attested by Hernando del Pulgar (1484), Pedro Bosca (1487) and Peter Martyr (1489).

The materia medica of the New World was described by Diego Alvarez Chanca, who accompanied Columbus on his second voyage and by Rodrigo Fernández. Alfonso Chirino, physician-in-chief to Juan II, published in 1447 a MS. *Especjo de la Medicina*, which professed to standardize prescriptions but in reality exploited very complicated ones (Sudhoff). Of much more historic and bibliographic interest are the Spanish medical incunabula, catalogued by Konrad Haebler (1903-17) in particular the pest-tracts. The art of **printing** was introduced into Spain by the Germán Lambert Palmar, who published *Obres e trobes en lahors de la verge Maria* by Bernardo Fenollar at Valencia in 1474. The finest specimen of Spanish medical printing is probably the black letter translation of Laufranc (*Cirurgia menor*), printed at Seville *por tres Alemanes compañeros* on May 15, 1495. As catalogued by Arnold Klebs, the Spanish **pest-tracts** are: the *Eclipse del Sol* of Diego de Torres (Salamanca, 1485), the *Regimen* of Lays Aleany's (Valencia, 1490), the *Aggregator* (Rome, 1499) of Pedro Pintor of Valencia, physician to the Pope Alexander VI; and the *Regimiento* of Fernan Alvarez (Salamanca or Barcelona, *circa* 1500). The Latin pest-tract of the Portuguese Valesco de Taranta (Padua, 1473) was translated into Spanish and printed at Barcelona (1475), Burgos (1495) and Pamplona (1495). The tract on syphilis by Gaspar **Torrella** of Valencia, physician to Alexander VI and Julius II, was published at Rome in 1497 and dedicated to Caesar Borgia, at that time Cardinal

Deacon of Valencia. It sounds an alarm over the accidents produced by salivation from mercurials, to which the death of Alfonso Borgia was attributed. In the second edition, printed at Blois (1499), small doses are recommended. Torrella, who afterwards became a Bishop, assisting at the Fifth Lateran Council, also wrote *Consilia* (1521) on the epidemic fever brought into Vizcaya in 1505 by the squadron of Flanders, which caused a mortality of 6000 in the northern province and spread all over Spain.

### THE GOLDEN AGE

The stretch of time covered by the reigns of Charles V and the three Philips (1516-65) is called by Spanish historians the *Siglo de oro*, their Golden Age. It was ushered in by such stirring events as the unification of Castile, León and Aragon under Ferdinand and Isabella, the conquest of Granada (1492) and the opening up of the New World by Columbus in the same year. In this period, Spain attained her height of military and naval prowess in Alva's campaigns, in the conquest of Mexico and Peru by Cortez and Pizarro and at the battle of Lepanto (1571). A little later, El Greco, Velázquez, Cervantes, Lope de Vega and Calderon gave her a position in art and letters second to none. The seeds of dissolution were already sown in the incursion of Ferdinand into Italy (1497) and the imperialist policies of Charles V and Philip II, which embarked the nation upon two centuries of meaningless wars, and depleted the enormous revenues derived from the colonies.<sup>8</sup>

In the 16th Century, Spain produced a number of physicians who were not without credit and renown among the anatomists, surgeons, obstetricians, medical scholastics and medical philosophers of the period. No less than Vesa-

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<sup>8</sup>The annual revenues of Spain under Philip II have been estimated at 24 billion ducats or \$360 billion, of which about one-half reached the national treasury, while the national debt left by the monarch was \$1½ billion. By 1600, the revenues were about \$270 billion, of which one-third was available, and the national debt in 1690 was still over a billion dollars. The purchasing power of these vast sums was far greater then than now.

lius was attached to the Spanish court from 1543 to the end of his life (1564) and Spanish anatomy was influenced by the *Fabrica* (1543) and its illustrations. Prior to Vesalius, Andrés **Laguna** (1494-1560), a medical graduate of Salamanca, who taught at Paris, Alcalá, Toledo and Bologna, published a book on anatomical method (dissecting) in 1535 and Luis **Lobera de Avila** a *Libro de Anatomia* (Alcalá, 1542). The chair of anatomy at Valladolid (*circa* 1550), the third in Europe after Bologna and Montpellier, was first held by Alonso Rodríguez de Guevara, a skilful prosector trained at Bologna, who did much to interest students in the subject and published a treatise at Coimbra in 1559. This was preceded by the *Anothomia del hombre* (Valladolid, 1550) of the Catalan anatomist, Bernardino Montaña de Monserrate, and followed by the well-known *Historia de la composición del cuerpo humano* (Rome, 1556) of

Juan Valverde de Hamusco, a pupil of Columbus and Eustachius at Padua, who became physician to Pope Paul IV. An Italian translation of this work was printed at Rome (1560) and reprinted at Venice by the Giunti (1586). A Latin translation of the explanation of the plates was printed by Plantin at Antwerp (1566) and reprinted by him in 1568, 1572 and 1579, as also a Dutch translation (Antwerp, 1568), reprinted at Amsterdam (1647). A complete Latin translation by Columbus was published by the Giunti (Venice, 1589) and reprinted in 1607. Italian translations of the Columbus version appeared at Venice in 1606 and 1682. The drawings, some of which derive from Vesalius, were made by the painter Gaspar Becerra and engraved by Nicolas Beautrizet, but as Choulant points out, the book contains several illustrations not in Vesalius. The description of the muscles of the eye is better, the small descending apophyses of the lumbar vertebrae are described for the first time and the nerves are conjectured to have a sheath, "like the bark of a tree."

From the Valencian school came Pedro Gimeno, a pupil of Vesalius (Padua) and Jacobus Sylvius (Paris), who published an exact description of the *stapes* as the "delta" (1549)<sup>2</sup>, which brought him into violent controversy with another Valencian anatomist, Luis Collado, who defends his master Vesalius in a commentary on Galenic osteology (1555).

An important work on **artistic anatomy** (human proportion) was the *Varia conmensuración* (Seville, 1585) of

<sup>2</sup>Pedro Gimeno: *Dialogus de re medica*, Valencia, 1549, cited by Garcia del Real.

the sculptor and goldsmith Juan de **Arfe y Villafañe** (1535- ), of Leon, who acquired a great reputation as the fabricator of the hosts and other altar objects in Spanish cathedrals and churches. To this group of artist-anatomists belong also Alonso Berruguete (1480-1561), Gaspar Becerra (1520-70) and Luiz de Costa (1599- ), who translated Dürer's book on human symmetry into Portuguese. As **precursors of Harvey**, Lobera (1542), Sanchez Valdez de la Plata (1545), Bernardino Montaña de Monserrate (1551), Juan Calvo (1596) and the veterinarian Francisco la Reina (*Tratado de Albeiteria*, Burgos, 1552), theorized about the circulation with an accuracy far in advance of their time and prior to Cesalpinus (1571-93) and the other Italian claimants.

Of the leaders of Spanish surgery in the 16th Century, the earliest and most important is

Francisco **Diaz**, a graduate of Alcalá who studied anatomy under Gimeno and Collado at Valencia, became surgeon to Philip II, published a surgical compend in the form of dialogues (1575)<sup>10</sup> and is memorable as the author of the first treatise on diseases and surgery of the urinary tract (1588)<sup>11</sup>. It contains an account of the high operation for stone, then called the Spanish method, as opposed to the "Neapolitan procedure" of Mariano Santo and explains the use of the urethral sound invented by Alderete.

Andrés **Alcazar**, of Guadalajara, a graduate of Salamanca where he subsequently held the chair of surgery, published a surgical treatise in 1575<sup>12</sup> and invented an apparatus for injecting or evacuating liquids into and from the chest.

Francisco **de Arceo** (1493-1575) graduated at Alcalá, and was a fellow student of the famous ecclesiastic philosopher Arias Montanus (1527-98), who also practised surgery and edited Arceo's posthumous work on the treatment of wounds (1576).<sup>13</sup> This book, which summarizes the experience of 45 years, was translated into English (by John Read, London, 1588), Dutch (1658, 1667) and German (Nuremberg, 1674). Arceo devised a balm called after him and a method of rhinoplasty highly praised by Sprengel, was against the stuffing of wounds with tampons, the abuse of sutures and the impalement of the cancerous breast in its amputation, but advocated bold trephining on occasion.

<sup>10</sup>Francisco Diaz: *Compendio de cirugia*. Madrid, 1575.

<sup>11</sup>Diaz: *Tratado de todas las enfermedades de los riñones, vejiga, carnosidades de la verga y orina*. Madrid, 1588.

Juan Calvo, a graduate of Saragossa and professor of medicine at Valencia, organized an Academy of Surgery in his own home, which drew many pupils. His surgical treatise of 1580,<sup>14</sup> was reprinted five times at Barcelona (1591), Madrid (1626, 1657, 1674) and Valencia (1690), and the section on ulcers was translated into French (Poitiers, 1596). He also published books on syphilis (1592), on internal medicine (1592) and a Spanish translation of the surgical treatise of Guy de Chauliac (Valencia, 1596).

Bartolomé Hidalgo de Agüero (1530-97) of Seville, was the first surgeon in Spain to teach the healing of wounds by first intention and became so skillful in wound surgery that duellists commended themselves "to God and the hands of Agüero." He was a voluminous writer, his most important surgical texts being his *Abisos* (1584) and his *Tesoro* (1604), both published at Seville. The latter contains the first Spanish treatise on the eye (*Historia del ojo*, 1586).

Juan Fragoso, of Toledo, was physician to Philip II and the author of two surgical treatises, viz., *Erotemas quirúrgicos* (Madrid, 1570) and a *Cirurgia universal* (Madrid, 1581; Alcalá, 1601). He also wrote a book on the officinal materia medica of Spain (Mantua, 1575; Madrid, 1583) and an account of East Indian medicinal plants (Madrid, 1572), a compilation from García ab Orta, Monardes and Clusius, which was later translated into Latin by Israel Spach (Strassburg, 1601).

Dionisio Daza Chacón (1503- ) of Valladolid, a surgeon in the armies of Charles V, was attached to the Military Hospital at Madrid (1557) and later to the Spanish fleet. He is said to have treated the wound of Cervantes at the naval battle of Lepanto (1574). His *Surgical Practice* (Valladolid, 1605),<sup>15</sup> reprinted at Madrid (1626) and Valencia (1630), describes his method of treating aneurisms and wounds of arteries by ligation. He was the first to recommend ligation of the tumor in the treatment of nasal polyps.

Perez Lopez de León worked under Agüero at Seville and later established himself in Cartagena, where he taught his master's methods. His principal work was a treatise on wound surgery (1628).<sup>16</sup>

All these surgeons were expert in trephining and each had his own particular technique in the treatment of such conditions as cancer of the breast and pleurisy. The first surgical publication to come from the New World was the rare and highly prized *Suma y recopilacion de cirugia* of Alfonso Lopez de Hinojoso (Mexico, 1595).

<sup>14</sup>Alcazar: *Chirurgiae libri sex*, Salamanca, 1575.

<sup>15</sup>Arce: *De recta curandorum vulnorum ratione*, 1575.

<sup>16</sup>Calvo: *Primera y segunda parte de cirugia universal*, Seville, 1580.

<sup>17</sup>Daza Chacón: *Práctica y teórica de cirugia en romance, y en latin*, Valladolid 1605.

<sup>18</sup>Lopez de León: *Práctica y teoria de las apostemas*, Sevilla, 1628.



The earliest Spanish works on the hygiene of pregnancy and infancy were those of Damian Carbón (Mallorca, 1541), Luis Lobera de Avila (Valladolid, 1551) and Juan Antonio de las Rueces y Fontecha (Alcalá, 1606). A defense of maternal lactation was published by Juan Gutierrez de Godoy at Jaen in 1529, and a book on children's diseases by Francisco Perez Cascales at Madrid in 1611.

During the 16th-17th Centuries, the bubonic plague ravaged Barcelona, Seville, Valencia, Zaragoza and Valladolid with heavy mortality and there was a goodly contribution to the tractate literature on this theme by Luis de Lucena (1523), Laguna (1542), Lobera de Avila (1542) and others.

Notable were the accounts of the epidemic at Zaragoza in May, 1564 by Juan Tomás Porcel (1565), which contains autopsy protocols; of the Valladolid epidemic by Ponce de Santa Cruz (1601); and of the outbreak at Seville in 1649 by Gaspar Caldera de Heredia (1650), all substantial contributions to the earlier literature of epidemiology. Among the syphilographers were Francisco Lopez de Villalobos (1496- ), of Valladolid, who published the first poem on lues (*Salamanca*, 1498)<sup>17</sup> and *Las problemas de Villalobos* (1543); and Rodrigo Diaz Ruiz de Isla, whose tractate of 1542<sup>18</sup> first advanced the theory of American origin of the disease. In the delineation of typhus fever and diphtheria, Spanish physicians took the lead. The first account of *tabardillo* or endemic typhus came from the New World, in the *Opera medicinalia* of Francisco Bravo (Mexico, 1570), and was later elucidated in Spain through the monographs of Alonzo López de Corella, of Luis Mereado and of Luis de Toro, all published in 1574. There were six epidemics of diphtheria in Spain during 1581-1638 and the disease was first described by Casales, Fontecha and Villa Real in 1611. These three tracts were followed by a number of valuable epidemiologic studies, the most exhaustive of which were those of Alfonso Nuñez de Llerena (1615), Jeronimo Gil Pina (Zaragoza, 1636) and Pedro Miguel de Heredia (1665). Phthisis was elucidated in a chapter of the *Tribunal Apollini* (1568) of Cristobal Pérez de Herrera, hydrophobia in the valuable monograph of Juan Bravo (Salamanca, 1571), melancholia and epilepsy by Andrés Velázquez (1585). The first book on massage was the *Enchiridion* (Zaragoza, 1589) of Bernardino Gómez Mendes, Bishop of

<sup>17</sup>Lopez de Villalobos: *El licenciado Villalobos sobre las contagiosas y malditas buvas*. Salamanca, 1498.

<sup>18</sup>Isla: *Tractado llamada Fructo de todos los Santos contra el mal serpiente venido de la Isla Española*. Seville, 1542.

Albarracín. The first work on the mineral waters of Spain was the *Espejo cristallino de las aguas de España* (Alcalá, 1697) by Ildefonso Limón Montero. The problem of unemployment and public charity was first handled in the *De subventionem pauperum* (Bruges, 1526) of the celebrated humanistic philosopher Juan Luis Vives (1492-1510), who was imprisoned by Henry VIII for his defence of Catherine of Aragon, and who proposed first hand observation of nature *vs.* blind submission to the ancients a century before Bacon, and, with Paez de Castro, revived Herodotus' view that history should not be limited to a trite chronologic narrative, but should deal with every aspect of social life (*Culturgeschichte*).

Another great work of humanitarian endeavor was the method of teaching the deaf and dumb devised by the Benedictine Pedro Ponce de Leon (1520-81), which is preserved in the *Reducción* (Madrid, 1620) of Juan Pablo Bonet. The first book on spectacles was the *Uso de los anteojos* of Benito Daça de Valdes (Seville, 1623).

The leading Spanish medical men of the Golden Age were Laguna, Mercado, Valles and Lobera de Avila.

Andrés Laguna (1499-1560), of Segovia, studied at Salamanca, Paris and Alcalá, graduated at Toledo (1539), accompanied Charles V on his campaigns in the Low Countries, rendered good service at the siege of Metz, renewed his studies at Padua (with Columbus) and Bologna, and became physician to Popes Paul II and Julius III. He discovered the iliocecal valve, which is described in his compend of dissecting (1535),<sup>19</sup> published a pest-tract (1542), a system of dietetics for poor students and paupers (1547), a method of excising caruncles of the bladder (1548)<sup>20</sup> and a treatise on diseases of the joints, with a translation of the *Tragopodagra* of Lucian (1551), and was an industrious commentator of Galen (1551) and Dioscorides (1551). He wrote a life of Galen (1518) and an epitome of his writings (1551). His annotations on Galen were highly commended by Haller.

Luis Mercado (1525-1611), of Valladolid, whose portrait by El Greco hangs in the Prado, was physician to Philip II and Philip III, wrote on therapeutics (1572), malignant fevers (1574), diseases of women (1579), pulse (1581), institutes of medicine and surgery (1594), diseases of the liver, spleen, kidneys and bladder (1594)<sup>21</sup>, practice (1601), hereditary diseases (1605), care and diseases of children (1611),<sup>22</sup> the nature of fever (1611). He also published one of the many Spanish accounts of plague (Madrid, 1599) and diphtheria (1614) and directions for the official examination of the *algebristas* or bone-setters (Madrid, 1599),<sup>23</sup> which was reprinted in Latin at Frankfort (1624). As a medical philosopher, his masterpiece was his *De veritate* (1601), for which he was called the Thomas Aquinas of medicine, a distinction hotly contested by Sprengel.

Francisco Valles (1524-92), of Covarrubias (Burgos), called the Spanish Galen and the "divine Valles," was a graduate of Alcalá (1553), who through

his commentaries on Hippocrates, Aristotle and Galen, did much to spread the taste for Greek medicine, as evidenced by the innumerable reprints of his learned annotations. Sprengel regards him as the ablest expounder of Arabic and Arabized medicine. He wrote on medical controversies (Alcalá, 1564), urine, pulse and fevers (Alcalá, 1569), therapeutics (Venice, 1589) and a tract on distilled waters (Madrid, 1592). His reputation as a medical philosopher is based upon his *Sacra Philosophia* (Lyons, 1588), a rational exegesis of the Bible.

Luis Lobera de Avila, who accompanied Charles V on all his campaigns and travels, is notable as the author of a book on personal hygiene and sterility male and female (Valladolid, 1551), which contains the first Spanish contribution to pediatrics. The original of this *Regimiento de salud* was published apparently before 1531, since it exists in a German translation of that date. The Spanish text of the pediatrics is surrounded by a garbled version of the Latin text of Bagellardo (Still). Avila also wrote on anatomy (1542), a post-tract (circa 1542), a book on diseases of sudden impact (*De morbis subitaneis*) and one on the four diseases of courtiers, viz., catarrh, gout, stone (vesical, renal and hepatic) and syphilis (Toledo, 1544).<sup>24</sup> The section on syphilis recommends mercurial inunctions and was reprinted in Latin translation by Luisinus (1560).

Akin to Vives and Valles in spirit is the group of medical humanists and philosophers, of whom two surgeons,

Amatus and Zacutus Lusitanus, Isaac Cardoso (*Philosophia libera*, 1573), Rodriguez de Castro, Luis de Lemos and Francisco Sanchez (1552- ) were of Portuguese Jewish origin, educated in Spain.

Of this group, Antonio Gomez Pereira (1500- ) was such an effective opponent of Galen, that his masterpiece, the *Antoniana-Margarita* (Medina del Campo, 1554) was almost entirely destroyed by perfervid Galenists. A pioneer work in pedagogics, phrenology, and vocational aptitude is the *Examen de ingenios para las ciencias* (1557) of Juan de Dios Huarte y Navasco. The *Nueva filosofía* (Madrid, 1587), an analysis of human passions which passed through many editions, is attributed on the title-page to Doña Oliva del Sabuco, but was really written by her father, Miguel Sabuco y Alvarez.

<sup>19</sup>Laguna: *Anatomica methodus*. Paris, 1535.

<sup>20</sup>Laguna: *Methodus cognoscendi extirpandique nascentes in vesicae collo carunculas*. Venice, 1543.

<sup>21</sup>Mereado: *De jecoris, splenis, renum et vesicae morbis, eorumque curatione*. Madrid, 1594.

<sup>22</sup>Mercado: *De morbis puerorum*, Valladolid, 1611. *De puerorum educatione, custodia et providentia*. Valladolid, 1611.

<sup>23</sup>Mereado: *Instituciones que su Magestad mando hazer al Doctor Mercado para el aprovechamiento y examen de los algebristas*. Madrid, 1599.

<sup>24</sup>Lobera de Avila: *De las quatro enfermedades cortesanas*. Toledo, 1544.

The *Restitutio Christianismi* (Vienne, 1553) of Miguel Servete or Servetus (1509-53), of Villaneuva (Aragon) contains his memorable account of the pulmonary circulation.

From the New World came the description of its plants in the *Sumario* (Toledo, 1525) of Gonsalvo Ferdinando de **Oviedo** y Valdez (1478- ) and the *De las drogas de las Indias* (Seville, 1565) of Nicolas **Monardes**. The mountain sickness of the Andes was described by the Jesuit traveller José d'**Acosta** (1540-99), of Medina del Campo, in his *Historia natural y moral de las Indias* (Seville, 1590), which was translated into English (London, 1604). The medicinal plants of the East Indies were described in the *Coloquio dos simples e drogas* (Goa, 1563) of the Portuguese naturalist Garcia de **Orta** and the *Tratado de las drogas* (Burgos, 1578) of Cristobal **Acosta** ( -1580).

During the 16th Century, universities were founded at Valencia (1500-1), Santiago (1504-26), Seville (1502), Toledo (1518), Granada (1531-7), and Oviedo (1574, opened 1608). In the 17th Century, Fernández de Navarrete records that there were 34 universities in Spain.<sup>25</sup>

The University of Madrid was slowly evolved from the Colegio de Doña Maria de Aragon, founded in 1590, and ultimately fused with the ancient university of nearby Alcalá in 1836-7.

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<sup>25</sup>As far as ascertainable, these were at Palencia (1212-14), Salamanca (1215-43), Huesca (1255-1354), Lerida (1300), Valladolid (1346), Barcelona (1450), Sigüenza (1472), Zaragoza (1474), Avila (1482-1807), Mallorca (1483; 1697), Alcalá de Henares (1499), Valencia (1500-1501), Seville (1502), Santiago (1504-26), Osuna (1515), Toledo (1518-20), Granada (1531-7), Lucena (1533), Bueza (1533; 1565), Sahagún (1534), Oñate (1542), Gandía (1547), Osme (1551), Almagro (1553), Oropesa (1553), Orihuela (1568), Tarragona (1572), Oviedo (1574; opened 1616), Vich (1599), Pamplona (1608), Gerona (1617), Solsona (1617), Tortosa (1645) and Irache. By the legislative reforms of 1857, these were reduced to 10 university districts, viz., Madrid, Barcelona, Granada, Oviedo, Salamanca, Santiago, Seville, Valencia, Valladolid and Zaragoza. On account of the long intervals between the successive charterings by Popes or Emperors, the subsequent dates of reorganization *longo intervallo* and other details, it is impossible to assign definite dates of origin to many of the mediæval and Renaissance universities. But many of the Spanish universities, little known to the historian, e.g., those at Oñate (Guipúzcoa), Baeza or Tortosa, were ornate structures of magnificent architectural design.

In the 17th Century, Spanish poetry, fiction and painting rose to a great height through the work of Lope de Vega and Velázquez (both born in Madrid), Cervantes (Alcalá) and Velázquez (Seville). Cervantes and Velázquez are related to medicine with reference to the depiction of border-line mental states: Cervantes through his moon-struck knight, Velázquez in his representations of achondroplastic, cretinoid, hydrocephalic and rachitic dwarfs and of idiocy. To this group of paintings belongs also Ribera's paralytic boy (Vienna Gallery) and Careño de Miranda's representation of endocrine obesity (Prado).

The great Spanish tradition in **bibliography** started with the *Bibliotheca hispana nova* (1672) *et vetus* (1696) of Nicolas **Antonio** (1617-84) of Seville, a tradition which was to be fruitful of colossal achievement in the Western Hemisphere and rivalled by the work of the Spanish cartographers only.

In the so-called *Geisteswissenschaften*, the writers of the 16th-17th Century Spain, were not only original but influential. In international law, Vitorio and Vázquez antedated Grotius, who acknowledges his debt to them. The *Política Indiana* (1629-39) of Solórzano was a great treatise on colonial government and finance. Long before Adam Smith, Martínez de la Mata announced that labor is the only true source of wealth, and the Proudhon-Soviet doctrine of the control and redistribution of private property by the state was ancient history to Luis Vives. Juan Páez de Castro (died 1570), chronicler to Philip II (1555), not only recommended that the king start a library in the Escorial,<sup>26</sup> but began it by donating his own collection of rare books and codices. His *Memorial de las cosas necesarias para escribir historia*, posthumously printed, formulates the program of the modern social, cultural and psychologic historian. The *Brevissima Relación* (Seville, 1552) of the colonial evangelist Bartolomé de las Casas

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<sup>26</sup>Páez de Castro: *Memorial sobre la utilidad de juntar una buena biblioteca*.

(1474-1566), which files his famous protest against cruelty to the Indians of the New World, is a humanitarian document of the first order.

#### THE PERIOD OF DECADENCE (1700-1800)

With the accession of Philip V (1700-1746), grandson of Louis XIV, the Hapsburg dynasty came to an end and the Bourbon began. The Spanish monarchs of the 18th Century were a series of "enlightened despots," whose able ministers and financial advisers tried to avoid war, where possible, and were thus able to recoup the depletion of the national treasury by reforms and economies, which brought about an interlude of relative prosperity, until the whole edifice was thrown to the ground again by the ruthless policies of Napoleon. Gibraltar was lost to England by the war of the Spanish succession (1700-13) and Philip V, under the sway of his second wife, Isabel Farnese of Parma, was again involved in expensive intrigue for Italian dominions; but he had the good sense to leave finance (*hacienda*) to the able Jean Orry, as did his successor, Ferdinand VI (1746-59) with his ministers, Enseñada and Wall. The same policies were pursued by Charles III (1759-88), the most enlightened of the group, who was guided by such strong and stable advisers as Aranda, Campomanes and Floridablanca. When the inept and sluggish Charles IV (1788-1808) dismissed Aranda and Campomanes in favor of Manuel Godoy, the trivial lover of Maria Louisa, the time was ripe for the political chaos and bloodshed of the Napoleonic period, with the long sequel of misrule, palace intrigues, insurrections and Carlist wars which followed up to the accession of Alphonso XIII. The maritime power of Spain was broken at St. Vincent and Trafalgar and her military power by Napoleon. Her South American colonies acquired independence one by one and were protected from European intervention by the Monroe Doctrine (December 2, 1823) and the support given the principle by George Canning in the House of Commons. Thus Spain lost colony after colony, and the relative prosperity engendered by the shrewd finan-

cial policies of her able ministers was again dissipated by the expenses of another century of senseless warfare and the equally wasteful expenditures of the court. The poverty and misery of the people engendered continual revolt and the invasion of the country by foreign soldiery initiated a carnival of rape and virtual murder of defenceless civilians. The ablest Spaniard of the time would seem to have been the great painter Goya, who satirized the contemptible spirit of the period with merciless precision. But a new spirit arose when the people of Spain revolted in mass against Napoleon, who was thrown out of the country as much by this guerilla warfare as by Wellington's infantry. The battle of Vittoria (1813), which anticipated Leipzig (1813) and Waterloo (1815), was regarded as so momentous in Central Europe that it was celebrated by a symphonic overture of Beethoven, played at the Congress of Vienna (November 27, 1814). The intrigue of the Spanish marriages and the subsequent reign of Isabella II (1843-68) was a prolonged political farce, and the loss of the Spanish Antilles and the Phillipines in the Spanish American war (1898) proved to be the term and end of decadence and ushered in the dawn of a new day. The uprising of the whole people of Spain against the tyranny of Napoleon on May 2, 1808 (*Dos de Mayo*) is now celebrated annually as their Independence Day.

Thus, even before the Golden Age, the germs of decadence were sown when Ferdinand of Aragon embarked upon the perilous policy of invading Italy for prestige and domination (1497). The defeat of the Invincible Armada (1588) and of the hitherto invincible Spanish infantry at Rocroy (1643) were already premonitory of Trafalgar. Yet to the middle of the 17th Century, Spain held her own fairly well in respect of intellectual production, while her period of decadence, although one of relative financial prosperity, was characterized by a creditable array of representatives in all branches of science, the fine arts and industry, none of whom had any decisive effect upon European culture except the great painter Goya, certain geog-

raphers and cartographers, and Manuel García, the teacher of singing who invented the laryngoscope (1855).

The 18th Century was a period of reform in medical education and public health administration as well as in finance and government.

An epidemic of plague in 1720 led to the formation of a National Board of Health (*Junta suprema de salud*), which was suppressed in 1740 and 1805, to be revived in 1743 and 1807 and reorganized in 1847. Close upon the expulsion of the Jesuits (1767), certain reforms in university reorganization were instituted, which resulted in better anatomical teaching at Granada (1777) and Valencia (1787). In this period, the status of anatomy, surgery and clinical medicine has been regarded by the Spanish medical historians as deplorable. In 1748, the first *Colegio de cirugía in Spain* was opened at Cadiz, another was created by royal mandate at Barcelona in 1760 (opened 1764), and a third at Madrid in 1778 (opened 1787). By a royal order of March 16, 1795, two chairs of clinical medicine were established in the Hospital general at Madrid, and similar courses were instituted at Valencia (1787) and Barcelona (1797). The Royal Spanish Academy was founded at Madrid in 1713 and the *Real Academia Nacional de Medicina* in 1733. The first Spanish medical periodical, the *Efemérides barométrico-médicas matritenses* (1734), was the literary organ of this Academy. Its title emphasizes the attention paid to medical meteorology by the 18th Century physicians. The Museo nacional de ciencias naturales (Madrid) was founded in 1771.

With reference to consequential position in the general history of European medicine, the leading Spanish physicians of the period of decadence were Gaspar **Casal**, who first described pellagra (*mal de la rosa*) in his *Historia Natural y Médica del Principado de Asturias* (1762); the surgeon Antonio **Gimbernat** (1734-1816), who, in 1768, devised a new operation for femoral hernia turning upon his discovery of the ligamentous structure in the crural arch which goes by his name; and the toxicologist Mateo José **Orfila** (1787-1853), of Mahon (Minorca), who studied at Valencia and completed his medical education in Paris, where he became Dean of the Paris Medical Faculty (1830), published well-known treatises on toxicology (1813-14), medical chemistry (1817), first aid (1818) and medical jurisprudence (1823-5) and played a leading and sometimes dramatic rôle in the trials and poisoning episodes of his period. Gimbernat, in 1768, also discovered



the Clocquet ganglion in the femoral ring, which he demonstrated to John Hunter in 1775 and described fully in 1793. In 1777, when Hunter was dilating on the dangers, incident to operating for femoral hernia, Gimbernat demonstrated to him his new method, which won from the Scotch surgeon the commendation: "You are right, sir. I will describe it in my lectures and will use it whenever I have occasion to operate on the living."

Of more local prominence and importance in the advancement of the national medicine was Pedro **Virgili** (1699-1776), the principal reformer of medical education in 18th Century Spain.

The son of a humble Catalan farmer, Virgili tilled the fields up to the age of 14, when he got a position as a barber-surgeon in the hospital at Tarragona, and after three years experience with venesection, proceeded on foot to Montpellier to begin his medical education. Here he devoted himself mainly to dissection and completed his studies in Paris. Returning to Spain, he was made Chief Surgeon of the Tarragona Hospital and a little later surgeon to the Royal Navy. He played a prominent part in the actions off Gibraltar and Oran and his account of a successful tracheotomy in the hospital at Cadiz was deemed worthy of publication in the *Memoirs of the Royal Academy of Surgery at Paris* (1743). He became physician to Ferdinand VI, which gave him his opportunity. At this time, the Spanish Navy was manned by foreign surgeons and when the Marquis de Ensenada decided to enlarge the fleet, Virgili laid his plans to set off this deficiency by the foundation of a College of Surgery for the Navy. He chose Cadiz, where he had a building constructed with complete laboratory and surgical equipment, at the same time sending medical students of unusual aptitude to Paris, Bologna, Leyden and London. In two years time (1748), his College of Surgery was opened with a personnel of 12 professors and 50 salaried internes, who were later increased to 100. The institution was in fact a surgical seminary, which became so successful that Virgili in 1758 secured royal permission to erect a similar College for Army Surgeons at Barcelona, which was completed and opened six years later (1764). Here fifty graduate internes were trained annually and to relieve the institution of any dependency upon the University or medical officialdom, it was put under the military command of the Captain General of Cataluña. This was the Declaration of Independence of Spanish surgery. From 1764 on, the medical confraternity of SS. Cosmas and Damian was forbidden to license surgeons. The most distinguished interne of the College at Cadiz was Gimbernat, who was entered in 1758 and, at Virgili's instance, was made professor of anatomy there in 1762.

Nearly forty years intervened between the opening of the College of Surgery at Cadiz (1748) and that at Madrid (1787) but in this period there was marked improvement in the quality of Spanish anatomy and surgery. The medical celebrities of the first half of the century were either confirmed hide-bound Galenists or closet anatomists, who did no dissecting.

Of the older dispensation were Solano de Luque (1685-1738), author of *Lapis Lydius Apollinis* (1731), a Galenic consideration of the varieties and subvarieties of the pulse; Martin Martinez (1684-1734), a highly cultured physician who was aware of the deficiencies in medical education and incurred bitter enmity by attempting to correct them, but whose *Noches anatomicas* (Madrid, 1723-50) and *Anatomia completa* (Madrid, 1730) is regarded by the Spanish medical historians as far inferior to the work of Valverde de Hamusco; Francisco Lloret y Marti, an exaggerated Galenic astrologer, who held the chair of anatomy and mathematics at Valencia for twelve years but wisely gave it up to become a titled functionary in Bilbao; and Andres Piquer (1711-72), who held the same chair at Valencia in 1742-51, during which time he devoted himself to the composition of books on physics (1745), and logic (1747) but ignored anatomy. He was a talented polyhistorian, whose treatise on fevers (Valencia, 1751-77) was translated into French and whose trilingual anthology of Hippocrates (Madrid, 1757-81), giving the Greek text with Latin and Spanish translations, was even more highly esteemed.

Of more scientific importance were

José Quer y Martinez (1695-1764), an army surgeon who revived Spanish botany in *Flora española* (1772), whom Linnaeus honored by naming the genus *Queria* after him and who wrote a pamphlet on the treatment of renal colic with *uva ursi* (1775); José Alsinet who wrote on the use of quinine in paludism (1774); the medical mathematician Antonio Capdevila, who corresponded with Haller and furnished him the Spanish data for his bibliographies; and two students of yellow fever, viz., the highly educated and combative Ignacio Maria Ruiz Luzurriaga (1736-1822) and José Masdevall, inspector general of epidemics in Catalonia, whose *Relacion de las calenturas putridas* was published in 1784-6.

The stimulating effect of the three colleges of surgery is sensed in the work of such men as

Leonardo Galli, author of a monograph on fractures of the patella (1795); Queralto and Rives, professors of surgery in the Madrid College; Jaime Bonells and Ignacio Lacaba, whose treatise on anatomy (1796) became the standard text-book in Spain for nearly half a century; Diego Velasco and Francisco Villaverde, whose treatise on operative surgery (1780) enjoyed

an equal popularity; Francisco Salvat y Campillo (1751-1828), champion of variolation and student of scurvy and yellow fever; Pedro María González (1763-1837) author of a treatise on naval medicine; Juan Palarea, called *el Medico*, who became a colonel of guerillas in the uprising against Napoleon; and the medical historian Antonio Hernández Morejón (1773-1836), who also served as a medical officer in the Army.

## THE NINETEENTH CENTURY

The first notable achievement in the 19th Century was the introduction of **vaccination** into Spain by Francisco **Pigillem**, who vaccinated three children at Pingcerdá in December, 1800.

He was followed by Gil y Albeniz in Rioja (1801), Pedro Martin in Cadiz, Luzurriaga and Zunzunegin in Madrid and Hernández Morejón in Valencia. It was then decided to carry the method to the New World. An expedition, headed by Francisco Xavier Balmis (1753-1819) was organized by a royal mandate of June 6, 1803 and carried the practice to all the Spanish possessions in the New World and in Asia. In Cuba, it was found that vaccination had already been introduced by Tomás Romay, but Balmis drew up the plan for a Central Vaccine Station (*Junta central de vacuna*) in the island. Upon his return, he was made Inspector General of Vaccination in Spain and the Indies and devoted the rest of his life to this detail. He published a book on the medicinal virtues of the roots of the agave and begonia (1794), which was translated into German (1797).

Prominent among the medical reformers of the early period were

**Pedro Castelló y Ginestá** (1770- ), professor at the College of San Carlos (1801) and physician to Ferdinand VII (1825), who was influential in bringing about the reforms in medical education of 1827 and the laws creating the Junta Superior regulating medical practice, the reforms in the army medical service, the mineral baths and the Academy of Medicine.

**Pedro Mata y Fontanet** (1811-73) of Reus (Tarragona) was imprisoned and twice banished for his political activities, coming under Orfila in Paris, and finally settling down as a government official in Madrid (1843-54), where he drew up plans for reforming medical education which were hotly discussed. He was again active in the September revolution of 1854, which brought him important preferment. He was professor of legal medicine in the Madrid Faculty and his most important work is his treatise on the subject (1844), which passed through five editions. Mata was a temperamental doctor, author of several novels, one of which (*Eloisa y Abelardo*) was suppressed.

**Mateo Seoane** (1791-1870) was driven by his political activities to spend the greater part of his life in England, where his services to public hygiene,

in particular during the cholera epidemic, were such that he was liberally recompensed by the government and admitted to the London Society of Medicine, the Royal Institute of Great Britain and the Royal College of Surgeons. He founded the London *Athenaeum* and compiled the well-known Spanish-English Dictionary (1830) which is still used: Returning to Spain in 1834, he drafted the prospective sanitary legislation of 1837 and during the remaining thirty years of his life, there was no advance in education, public hygiene or social welfare of which he was not the principal prime-mover.

The most active propagandist for the study of public hygiene was Pedro **Monlau y Roca** (1808-71) of Barcelona, who served in the army (1833-47), the Board of Health (1847-71) and came to the chair of hygiene in the Madrid Faculty in 1854. His principal contributions were treatises on public hygiene (1847), marital hygiene (1853) and industrial hygiene (1856), and a number of humorous writings, such as his one-act comedy on quackery (*Lo que es un curandero*, 1830).

The Spanish **anatomists** of the 19th Century derive from the famous text-book of Bonells and Lacaba (1790), which was in use up to 1850, and from the dissections of Gimbernát and Lacaba in the Colegio de San Carlos (Madrid). From Gimbernát stemmed the long line of anatomists and surgeons of the Madrid Faculty:

Up to 1830, Argumosa, Castelló, Roca y Gutierrez and Hisera; during 1840-60, Sanchez Toca, Corral, Viñals, Fourquet; and in the later period Martinez Molina, Villanueva, San Juan, Creus, Velasco and Calleja; in Granada, San Juan Oloriz, Creus, Ribera; in Valladolid, Calleja and Salvino Sierra; in Valencia, Llobet, Zurriaga, Gomez; in Barcelona, Letamendi; in Cadiz, Rubio y Gali, who taught the Dominguez, Ametters and Benjumedas; in Santiago, Freire, Teyero and Romero Blanes; in Zaragoza, Vega y Lozano and Cajal.

Of this line of apostolic succession from Gimbernát to Cajal, the most remarkable were

Federico **Rubio y Gali** (1827-1902), who made his modest dissecting room at Cadiz famous for accurate and solid practical work; Juan **Fourquet** (1807-65), of Madrid, who came to the Madrid chair in 1848, discovered the stylo-auricular muscle, corrected many errors in classical anatomy, particularly of the locomotor and vascular systems, made a topographical chart, created the Iconographic Museum of the Madrid Faculty (1853), and left his modest fortune to establish an annual anatomical prize of 500 pesetas for second year students; Pedro Gonzales de **Velasco** (1815-82), who neither discovered nor wrote anything, but impoverished himself by squandering his immense fortune of 3 million reales on the erection of a Museum of Anthropology (1875)<sup>27</sup> and Medical Studio for the Madrid

Faculty. He has been canonized in a biographical eulogy by his pupil, Angel Pulido (1894); Federico Olóriz y Aguilera (1855-1912) of Granada, who founded the Craniological Museum in the Madrid Faculty, containing 2,250 skulls with complete authenticated data in each case, published studies on the geographic distribution of the cephalic index, based on 8,368 measurements (1892), on height (1896), longevity (1898) and illiteracy (1900) in Spain, and a manual for the identification of delinquents (1911); José de Letamendi y Manjarrés (1828-97) of Barcelona, who wrote on criminology (1883), origins of handwriting (1885), a Course of General Pathology (1883-9), a Course of General Clinics and who was also a versatile painter and musician and composer of a requiem mass, which is sung in the Monastery of the Escorial. Julian Calleja y Sanchez (1836-1913) a pupil of Fourquet, taught successively at Granada, Valladolid and Madrid, and wrote several anatomical text-books, including treatises on myology (1872), angiology (1877) and embryology. Marcos Viñals (1812-95), of Burgos, demonstrated the origin and course of the chorda tympani in a unique preparation of the internal ear (1841).

The Spanish surgeons of the 19th Century make a long list. Spain claims priority for Romero in pericardiotomy (1819), for Rubio y Gali in the Halsted operation for cancer of the breast, for Argumosa (1832) over Dieffenbach (1834) in the performance of blepharoplasty and for parotidectomy without previous ligation of the external carotid (1834); for Ribera (1878) over Estlander (1879) in resection of the ribs for pleurisy (Gustav Simon, 1869), and over Momburg in the use of the abdominal hæmostatic ligature.

At the head of the modern group, García del Real signalizes

Alejandro San Martín (1847-1908), professor of pathology and clinical surgery in the Madrid Faculty, who devoted the last decade of his life to the study of experimental vascular anastomosis. A case of extensive gangrene of the foot from obliterative endoarteritis suggested to him the possibility of relieving the obstruction by arterio-venous anastomosis. He

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<sup>27</sup>In this grandiose undertaking, poor Velasco was fleeced by unscrupulous contractors, lost his chair and clientèle, and when at last, reduced to penury, he tried to persuade the Madrid Faculty to purchase his museum, he was snubbed with the inevitable come-back: "Nobody asked you, Sir, she said." Ignored by old friends and patients, he was driven to accept the simple charity of humbler people. This trait of meridional Quixotism, charming in itself, illustrates the shrewd observation of Lord Bacon that the Spaniard is "seeming wise." Another hobby horse was the continuation of the *faïre la guerre* policies of Charles V and Philip II.

performed 40 experiments on 36 dogs, then tried out his method in two cases of gangrene of the foot (1902), but without evading the necessity of amputation. His work was, however, in the new trend of vascular surgery continued by his pupil Goyanes, Jaboulay, Carrel, Wieting and others. In 1898, San Martín devised a method of amputation at the hip-joint.

### The leading surgeon of the early period was

Diego de Argumosa y Obrégón (1792-1865). In his *Resumen de cirugía* (1856) he described and recommended phleborrhaphy as a substitute for ligation of the veins, although he never attempted the operation himself. Argumosa devised methods of cheiloplasty, perineal urethrostomy (Poncet) and amputation of the hip, excised the parotid gland (1832), the tongue (1835), excised the penis for cancer (1845) and in 1832 performed blepharoplasty. His priority was disputed by Joaquín Hysern (1804-83), who claimed that he had done the temporo-facial operation with success in 1829 and 1833.

At Granada, José Ribera y Sans (1852-1912) employed, as stated, the Momburg elastic ligature of the abdomen for hæmostatic purposes, is credited with resection of the ribs for empyema (1878), made a study of 117 cases of hydatids (1908) and devised original methods of trephining (1898), posterior mediastinotomy (1899), total gastrectomy (1902-11), interilio-abdominal amputation (1903-11) and paraperitoneal laparotomy (1908), also a theoretical approach to the pituitary (1910).

Federico Rubio y Galí (1827-1902) founded the surgical institute (*Instituto de terapéutica operatoria*, 1880), or Instituto Rubio in the Hospital de la Princesa on the heights of Moncloa (Madrid), was the first surgeon in Spain to perform ovariectomy (1860), hysterectomy (1861), nephrectomy (1874) and laryngectomy (1878), and turned out among his pupils such specialists as Ariza (oto-rhino-laryngology), Sverder (genito-urinary surgery), Buisen (neurology) and Gutierrez (gynaecology).

Eugenio Gutiérrez y González (1851-1914) was the founder of gynaecology in Spain. He became gynaecologist to the Rubio Institute in 1881 and contributed to all phases of the subject. He was also an able obstetrician and was summoned to deliver the Queen in May, 1907. Another pioneer in gynaecology was Miguel Ángel Fargas y Roca (1858-1916), who performed the first ovariectomy for cyst (1882) and the first gastro-enterostomy (1895) in Spain.

Salvador Cardenal (1852-1927) of Barcelona, was the pioneer of anti-septic surgery in Spain and author of a book on the subject (*Cirugía antiséptica*, 1880).

Juan Creus y Mansó (1828-97), like Argumosa, devised methods of cheiloplasty and amputation at the knee-joint (1885).

Melchior Sánchez de Toca (1806-80) performed abdominal hysterectomy for uterine tumor (1845), and in the same year, another Spanish marquis, Tomás Corral y Oña (1807-82) is said to have performed the vaginal Cæsarean operation introduced by Dührsen in 1898. Priority over Billroth

(1889) and Jaboulay (1894) is claimed for Felipe **Margarit**, of Barcelona, in the performance of the interilio-abdominal amputation at the hip-joint (1888).

### The leading **obstetricians** of the period were

Francisco **Cortejarena y Aldebo** (1835- ) and the Marquis **Andrés del Busto** ( -1899), editor of *España Médica* (1856-66), the organ of the Academy of Surgery, and founder of *Iberia médica* (1857-8).

### Prominent also among the **medical journalists** were

the reformer **Rafael Rodríguez Mendez** (1845-1919), rector of the University of Barcelona (1901), who founded the *Gaceta médica catalana* (1881) and organized the first Spanish Congress of Tuberculosis (1910); **Francisco Mendez Alvaro** (1806-83), founder of the *Boletín de medicina y farmacia* (1834-5) and editor of its successor, *Siglo médico* (1854-83); **Matias Nieto y Serrano** (1813-1903), who founded the *Boletín mensual de novedades médicas* (1841), which became the *Gaceta médica* in 1842, with Fourquet as co-editor, and ultimately fused with the *Boletín de medicina, cirugía y farmacia* (1834-54) to form the *Siglo médico* (1854); and **Antonio Valázquez de Castro** (1840- ) founder of the *Presna médica de Granada* (1879), which became in 1882 the *Gaceta médica del Sur de España*.

### Among the earlier **clinicians**, a notable Triton among the minnows was

**Vincente Asuero Cortazar** (1807-73) author of *Terapeutica substitiva* (1850) and reputed to be the leading Spanish physician of his day. The outstanding internist of the later period was **Maximo Teijéro** (1827-1900), who translated several books and was detailed by the king to report on Pasteur's treatment of rabies in 1886. A pioneer in **dermatology** was **Benito Hernando y Espinosa** ( -1916), memorable for his self-sacrificing labors during the cholera epidemic of 1885 and his massive report on leprosy in Granada (1884), which drew both Virchow and Neisser to the city. The onstanding authority in dermatology in Spain was **José Eugenio Olavide**, author of a great treatise in three volumes (1871-80) and of clinical studies on the herpetic and rheumatic dermatoses. In the field of diseases of the ear, nose and throat, **Ramon de la Sota y Lastro** (1834) founded the *Instituto de otorhinolaryngologia*; **Ricardo Botey**, author of clinical studies (1891-3) and a textbook (1902), founded the international *Archivos* (1890) devoted to the subject; **Vincente Llorente y Matos** (1857-1916), founded the *Instituto Llorente* (de microbiología y seroterapia, 1894), was the first to perform intubation of the larynx in Spain (1896-7), analyzed 3500 cases of diphtheria (1904) and did experimental work on tissue cultivation with Carrel at the Rockefeller Institute (1913). **A. García Tapía** made a notable contribution to **neurology** in his account of partial right-sided and total left-sided hemiplegia allocated to a lesion in the medulla (1905). A similar contribution was made by the ophthalmologist **J. A. Barraquer** of Barce-

lona, who first described progressive lipodystrophy (1906) and devised the well-known procedure for extracting cataract (phakoeresis, 1917). Cayetano del Toro, once a gynecologist, went over to ophthalmology and became editor of the *Cronica oftalmologica* (Cadiz, 1873-83). Rafael Cervera (1828-1903) founded the Casa de misericordia de Santa Isabel (1857) and became director of the Instituto oftalmologico founded by Delgado Jugo. Rodolfo de Castillo (1850- ) devised a new method of resecting the inferior maxilla (1889) and made a study of Roman ophthalmology (1905), which was translated by Max Neuburger (1907). Of the physiologists, Pi y Suñer and Ramon Turro were outstanding in Barcelona, and José Gomez Ocaña (1860-1919) in Madrid. A pioneer in pediatrics was Mariano Benevente (1818-85). In the later period, Manuel Tolosa Latour (1857-1919) was editor of several pediatric periodicals, translated many foreign books, and founded the seaside sanitarium for tuberculous children at Chipiona, near Cadiz (1897). Among the psychiatrists, José Maria Esquerdo (1842-1912) played a gallant part in the cholera epidemics (1865, 1885) and the Carlist wars (1874), founded the famous asylum (Manicomio) at Carabanchel (1877) and was a member of the Cortes during 1893-1900. In medical jurisprudence, criminal anthropology and morbid psychology, the Spaniards, like the Italians, have done good work, in particular Lecha Marzo, Bernardo de Quirós and José Ingegnieros (1877-1925). Antonio Lecha Marzo (1888-1919), a medical officer of the Spanish Army (1911), who held the chair of legal medicine at Seville (1914) wrote on such themes as finger prints and scientific palmistry (1912), medico-legal microchemistry and such like, and died prematurely, leaving an unfinished textbook. A precursor of Ramón y Cajal in neurohistology was Luis Simarra y Lacabra (1851-1921) founder of the Spanish Association for the Advancement of Science, who held the chair of experimental psychology in the Madrid Faculty. He left his entire fortune and estate, including his splendid library, to the project of founding an Institute of experimental psychology at Madrid. Finally, let mention be made of the dramatist, José Echegaray (1832-1916), whose remarkable plays, often dealing with pathologic and psychiatric themes, won him the Nobel Prize in 1905.

Important reforms in **medical education** and **sanitation** were effected by the Royal Decree of July 4, 1827, uniting the Spanish medical faculties under a single Junta, the plan of Pedro Mata for further reorganization of medical education, confirmed by a Royal order of October 26, 1843, and corrected by the legislation of 1847, which centralized higher public instruction in ten universities, controlled by a Minister of Education, with medical faculties of the first class at Madrid, Barcelona and Cadiz, and of the second class (five year courses) at Valencia, Santiago, Salamanca and Granada. All this was further modified by leg-



isolation of 1849-61, up to the law of October 25, 1868. Many mediæval formalities and red-tape obstructions to progress were abolished in the sanitary legislation (*ley de sanidad*) of November 28, 1855.

In **medical history** Spain has a record of very solid performance, as also in **bibliography**, from Nicolas Antonio to Menéndez Pelayo and the achievement of Toribio Medina in Latin America. Of the medical historians,

Antonio Hernández Morejón (1773-1836) and Anastasio Chinchilla y Piqueras (1801-67) were army surgeons, and Chinchilla, in particular, rendered valiant service in the Carlist insurrection of 1835. Morejón's posthumous *opus magnum*, a Bibliographic History of Spanish Medicine (1852), was published by his literary executors Juan Gualberto Aviles (1799-1865) and Chinchilla, in whose arms he expired in his last illness and who was later accused of ingratitude toward the master by his bitter rival, Aviles. Chinchilla's principal performance is his *Anales históricos* (1841-6), consisting of a general history of medicine (1841-4), a history of surgical operations (1841) and a history of Spanish medicine (1845-6). These works are invaluable for bibliographic reference, worthy successors, in fact, of the *Epidemiologia española* of Joaquin de Villalba (1802). The hygienist Luis Comenge y Ferrer (1854- ) is the author of *Curiosidades médicas* (1886), *Clinica egregia* (1895), medicine in the reign of Alfonso V of Aragon (1903), and notes on the history of Spanish medical culture (1914). Another hygienist, Joaquín Olmedilla y Puig has published valuable biographical studies of Andrés Laguna (1887), Nicolas Monardes (1897), Cristobal Acosta (1899) and Vesalius in Madrid (1913). The study of Arnold of Villanova (1879), by Marcelino Menéndez y Pelayo (1856-1912), late librarian of the Biblioteca nacional (Madrid) deserves mention here, as also his unfinished history of Spanish science (*La ciencia española*, 1889) and his *Bibliografía hispano-latina clásica* (1902), which represents the work of a lifetime. Apart from the *Bibliotheca* of Nicolas Antonio (1672-96), which was reprinted in 1783-88 as a set-off to the *Bibliotheca Lusitana* (1741-59) of Diego Barbosa Machado, the principal bibliographic lists of Spanish literature are the *Diccionario general* of Dionisio Hidalgo (1862-8), B. J. Gallerdo's list of rare and curious books (*Ensayo*, 1863-89), the bibliography of Spanish books of 1401-1833 by Manuel Serrano y Sanz (1903-5), a catalogue of Portuguese authors who wrote in Spanish by Domingo García Perez (1890), a bibliography of Spanish and Portuguese books and translations printed in Italy by Enrico Zaccaria (Carpi, 1907), Mayer Kayserling's list of books by Spanish and Portuguese Jews (Strassburg, 1890), Konrad Haebler's list of Spanish incunabula (1903-17) and Henry Thomas' Short Title Catalogue of Spanish books of 1496-1600 in the British Museum Library (1921). The Junta de iconografía nacional, established in Madrid (1906) for the collection of portraits of national celebrities, has published

an index catalogue of these (*Indice de retratos*) in 10 parts. The respectable tradition for careful bibliography established in Madrid in 1672 has been more than surpassed in the New World. Printing was begun in Mexico in 1539, a century before the Bay State Psalm Book (1640) saw the light, and the first Mexican medical book (1570) antedated Thomas Thacher's broadside on smallpox (Boston, 1677) by 107 years. Mexican literature of the 16th Century has been catalogued in the indispensable *Bibliografía mexicana* of José García Icazbalceta (1886-1903), that of the 17th Century by Vicente de Andrade (1900), that of the 18th Century by Nicolas León (1902-7), the medical historian and anthropologist of Mexico, whose work is based entirely upon original sources in his own country and whose *Adiciones* to Icazbalceta (1903) comprise 116 rare Mexican books printed between 1593 and 1600. In addition, José Mariano Beristain y Souza is author of a bibliography of South American literature by 4000 authors (1883-97) and José Toribio Medina has published a history of printing in Mexico during 1539-1821 (1907-9) and special studies of early printing (1904) in Guadalajara (1793-1821), Merida (1813-21), Oaxaca (1720-1820), Puebla de los Angeles (1640-1821) and Vera Cruz (1794-1822). Toribio Medina is, in fact, the leading bibliographer of Latin America. He is the author not only of a bibliography of Spanish American literature of 1493-1810 (1898-1907) but also special histories of printing in Argentina (1892), Chile (1897-99), Bogotá, Colombia (1904), Havana, Cuba (1904), Quito, Ecuador (1904), Guatemala (1910), Paraguay (1892), Lima, Peru (1904-7), Montevideo, Uruguay (1892) and Caracas, Venezuela (1914). Bolivian literature has been catalogued by J. R. Gutierrez (1875-80) and G. R. Moreno (1879-1900), that of Brazil by I. F. Da Silva (1858-1911), A. V. A. S. Blake (1883-1902), and J. C. Rodriguez (1907), that of Chile by Louis Montt (1904-20), that of Colombia by I. Laverde Amaya (1882-95) and Eduardo Posado (1917), that of Cuba by Carlos M. Trelles (1861-1918), that of Ecuador by F. González Suárez (1917), that of Guatemala by J. E. d'Oryan (1917), that of Peru by R. Moreno (1896) and C. A. Pret (1903), that of Uruguay by B. Fernández y Medina (1900) and Dardo Estrada (1912), that of Venezuela by Manuel Segundo Sánchez (1910-4). The leading bibliographer of the Philippine Islands was Wenceslao Emilio Retana, who catalogued the books (1895-1905) and printers (1908), while Toribio Medina catalogued 420 books printed in Manila during 1593-1810.

To do more than outline the extension of Spanish medicine in the Spanish colonies is beyond the scope of the present survey. Mexico had the first hospital (erected by Cortez, 1524), the first chair of medicine (1578-80), the first medical publications (1570, 1578) and the first medical periodical (*Mercurio volante*, 1772) in this hemisphere. Universities were started at San Domingo (1538), Mexico (1551), Lima (1553, Medical Faculty 1638), Manila (1601,

Santo Tomas 1611) and Caracas (1725), to name only the oldest, but the development of medicine in these Spanish colonies is, for the most part, shrouded in darkness and awaits its historians. Apart from the superlative work of Nicolas **León**, the only investigation of adequate dimensions which has thus far been published is the history of medicine in Uruguay by Rodolfo **Schiaffino** (Montevideo, 1927).

Mention need only be made of the *res gestae* of such men as Eduardo Licéaga (1836-1920), Rafael Lavista, Antonio Peñafiel, Estrada and León in Mexico; of Carlos **Finlay** (mosquito theory, 1881), Juan Guiteras (1853-95), Juan Santos Fernandez (1847-1922) and Aristides Agramonte in Cuba; Gaspar Vianna (kala azar), Oswaldo **Cruz** (1872-1917) and Carlos **Chagas** (*Trypanosoma Cruzi*, 1909), Vital Brazil and Amaral (Instituto Butantan) in Brazil; Carlos Malbran and José Penna in Argentina; or José **Albert** (infantile beri beri 1908-24), T. H. Pardo de Tavera (Filipino materia medica, 1892) and Cristobal Manalang (hookworm, malaria) in the Philippines. Under American government, the public hygiene of the Philippines has advanced apace. An excellent beginning in the medical history of the Philippines was made by Anastasia Villegas in 1923.<sup>28</sup>

## THE TWENTIETH CENTURY

In the 20th Century, Spanish medicine made its first noteworthy contribution to the broad current of European medicine in the work of Santiago **Ramón y Cajal** (1852-) and his pupils.

The son of an Aragonese surgeon, Cajal had in his composition the hardy independence, self-will, tenacity of purpose and long memory of the man of mountaineer stock. Having damaged his health from tropical infections during service as a medical officer of the Spanish Army in Cuba (1874-5), he held in succession the chairs of anatomy at Zaragoza (1877), Valencia (1884) and Barcelona (1887), where he got such results in neurohistology from his modification of the silver-chrome stain invented by Golgi (1880-85) that his appointment to the Madrid chair, coincident with the publication of his great memoir on the retina (1892), was a foregone conclusion. With the aid of his silver nitrate-pyrogalllic acid stain (1903), his gold-sublimite stain (1913) and other methods devised by him, he elucidated the finer anatomy of the entire nervous system as never before, and with a single eye to the ultimate rôle of these minutiae in the dynamics of nervous function. He founded the *Revista trimestral micrográfica* (1897), was ap-

<sup>28</sup>A. Villegas: *Ann. Med. Hist.*, N. Y., 1923, V, 229-241.

pointed director of the *Instituto nacional de higiene de Alfonso XIII* (founded 1900) and in 1903, acquired a *Laboratio de investigaciones biológicas* (Madrid), which after his retirement, became the Instituto Cajal. He was awarded the Moscow prize of the International Medical Congress at Paris (1900), the Helmholtz medal of the Royal Prussian Academy (1904) and, in 1906, the Nobel Prize, conjointly with Golgi. In 1913-14, Cajal summarized his lifetime of labor in his great treatise on Degeneration and Regeneration of the Nervous System, printed at the expense of Spanish physicians in Argentina and reissued, fifteen years later, in English translation by the Oxford University Press (1928). This deals, as stated, with the minute structural basis of neurodynamics (*anatomia animata*) and its rôle in the transmission of nervous impulses, localization of function, degeneration and regeneration of the neurons and axons of the nerve centers.

In his youth, Cajal had cherished the audacious dream of founding a school of Spanish histologists and he succeeded in a measure probably far beyond his expectations, comparable, indeed, with that of Pavlov in Leningrad. Memorable among the pupils of Cajal are

Nicolas Achúcarro, (1851-1918), who devised a stain for connective tissues and worked mainly on the neuroglia; Pio del Rio Hortega, who discovered the microglia and oligodendria cells (1919); Francisco Telló, who succeeded to Cajal's chair of histology in the Madrid Faculty and has worked on the neurofibrillæ, transplantations of cerebral nerves and regeneration of nerve-endings; Villaverde (neuropathology), de Castro (neuroglia, sympathetic ganglia), Sanchez (comparative neurohistology) and Llorente de Nô (auditory and vestibular nerves).

Finally, Cajal has told the story of his life with straightforward simplicity and charm in his *Recuerdas de mi vida* (1907-17; 2. ed., 1928), while the aphorisms, epigrams and philosophic anecdotes in his *Charlas de café* are among the most pungent and effective to be found in the entire literature of the Latin races. In solid performance, Ramón y Cajal is the greatest figure in the history of Spanish medicine, in point of character, the most eminent man his country has produced in several centuries.

In his autobiography, Cajal laments the "barrier of language" which, in earlier days, stood in the way of a readier acceptance of his work and a similar regret has been voiced by Dr. Eduardo García del Real, professor of history of medicine in the Madrid Faculty, with reference to the gen-

eral ignorance of the outstanding figures of Spanish medicine in Europe and the United States.<sup>29</sup> As the successor of Hernández Morejón and Chinchilla, García del Real has published a history of Spanish medicine (1921),<sup>30</sup> which surpasses any similar record of local medical achievement in any other country. It is a genuine piece of research work, covering nearly 1150 pages, exhaustive, documented, recording with scrupulous fidelity and patriotic devotion every fact and date accessible to its author, with a goodly showing of the cultural achievement of Spain in other branches of science, invention, literature and art.

Yet it is a difficult book to assimilate, partly from lack of a just sense of proportion and literary style and the faulty arrangement of some of the material, but more particularly on account of the lengthy, humorless citations of extravagant eulogy and the apparent failure of the author to strike a balance between what is of definite local importance in Spain and what may be of moment on the broad highway of progressive scientific medicine. With this criterion in mind, he could have said all he has to say in a fraction of the space required, and he might have coördinated his facts and dates to better purpose by stripping down the lengthy eulogies to their bare essentials. The barrier of language, then, lies not in the Spanish idiom itself, which is beautiful, graceful and easy of comprehension, but in the fact that where Spanish poetry is often concise and to the point, Spanish prose, and particularly Spanish scientific prose, is too prone to be diffuse, verbose, florid and rhetorical. The Spanish language is, in fact, a social and artistic, rather than a scientific medium. Yet the spoken idiom, the *chistes* and *coplas*, the national proverbs, the dialogue in Tirso de Molina, the epigrams in

<sup>29</sup>One necessary and sufficient reason for this spirit of *nil admirari* in the past was the antipathy created among the Northern (Protestant) nations by the Counter-Reformation (Thirty Years War), the Great Armada and the invasion of the Netherlands. The irritation of the people of the Italian principalities against the Spanish viceroys, superimposed by Isabel Farnese, is a leading motive in Stendhal's novel, *La Chartreuse de Parme*.

<sup>30</sup>E. García del Real: *Historia de la Medicina en España*, Madrid, 1921.

the *Charlas* of Cajal are as terse and to the point as the rollicking Gammer Gurton verses of the Arcipreste de Hita or the *Humoradas* of Campoamor, in which not a syllable is wasted. A fair example of the concision of which Spanish poetry is capable is afforded in the sonnet of Castelo y Serra in memory of Argumosa, the most eminent Spanish surgeon in the first half of the 19th Century :

“Grave, severo, mesurado, frío;  
 Buen esposo, buen padre y ciudadano;  
 Por su carácter, todo un espartano;  
 De trato dulce, aunque exterior sombrío.  
 Como Catón incorruptible, pío;  
 Correcto en la dicción, firme de mano;  
 Como muy pocos, habil cirujano;  
 A la hora del deber nunca tardío.  
 Tan pulcro en el obrar como en el traje,  
 Y docto en escribir castiza prosa  
 Como en poner artístico vendaje  
 Despues de hacer operación pasmosa,  
 Y genio, en fin, de superior linaje,  
 Tal fué, señores, Diego de Argumosa.”

Sophisticates of our flippant post-bellum period may smile at the measured, sober-sided, pedestrian eulogy of these verses, even as pudibond readers of the Victorian “Age of Innocence” would experience horripilation at the sexual cynicism of present day poetry and illustration. Yet judged by the standards of the time in which it was written, the above sonnet is no more lapidary than scores of others of the same period, from Wordsworth or Shelley to Lowell or Swinburne. What it does say to us is that for Spain, too, is apposite the dictum which Mr. Matthew Arnold applied to the literature of our own country: “The glorification of the average man is too much of a religion there.” The best one can say of many of the Spanish medical authors cited by García del Real is that they wrote books of average merit on the subjects and specialties in which they happened to be interested. The Fifth Paragraph of Army Regulations, which forbids, “the foolish face of praise” as well as blame, holds up a value seldom appreciated by the historians of science and medicine. The

victim of maladroit laudation by benevolent big-boy enthusiasts at festal dinners and banquets may live to regret the sensible sobriety of more spacious days—

“Ni cet excès d’honneur, ni cette indignité”;

or even the acid tests of a more ironic and aristocratic period—

“Go on, dear creatures, make me see  
All that disgraced my betters meet in me,”

OR

“Is this a dinner? This a genial room?  
No, ’tis a temple and a hecatomb,”

OR

“I sought no homage from the race that write,  
But hid like Asian monarchs from their sight,”

OR

“One from all Grub Street doth our fame defend  
And (more abusive) calls himself our ‘friend’.”

The isolation and lack of appreciation of Spanish medicine which García del Real laments is due, in part, to the physical isolation of his country, to the intransigence occasioned by the wars of the Counter-Reformation among Nordics, and to that natural feeling for past glories, which has prevented Spanish historians from evaluating things of merely local consequence with reference to their status (if any) in the larger atmosphere of global medicine. The impersonal scientific contributions of such men as Cajal, Achúcarro, Hortaega, Tapía and Barraquer have gone far to lift Spanish medicine out of the same tedious provincialism which once obsessed the medical literature of our own country, and prelude, let us hope, the dawn of a newer and fairer day for Spanish science.

## CHRONOLOGY OF SECULAR AND MEDICAL HISTORY IN SPAIN

630. First Greek voyage to Spanish coast.  
6th Century. Scylax refers to Ebro River (Iberus).  
550. Carthaginians enter Spain.  
236-228. Hamilcar Barca enters Spain and founds Barcelona.  
219. Hannibal destroys Saguntum.  
206 B.C.-409 A.D. Roman occupation.  
202. Scipio Africanus defeats Hannibal at Zama (end of Carthaginian dominion).  
Romanization of Spain.  
146 B.C. Romans destroy Carthage.
- 205 B.C.-14 A.D. First Church Council at Iliberis (Elvira).  
146 B.C. Visigothic Spain.  
A.D. Athangild establishes Visigothic capital at Toledo.  
306. Isidore of Seville.  
409-713. Bishop Masona founds hospital at Merida.  
554-567. Conversion of Arabs to Mohammedanism.  
570-636. Moslem conquest of Spain.  
580. Moslem occupation.  
622. Charles Martel defeats Moslems at Tours.  
711-718. Ommayad capital established at Cordova by Abd-er-Rahman.  
711-1031. Ommayad Dynasty (Cordovan Caliphate).  
732. Abd-er-Rahman III (height of Moorish civilization and naval power in Spain).  
755. Almansor.  
755-1031. Crusade for independence from Moslem rule.  
913-961. Monks of Cluny (Benedictines) enter Castile.  
976-1002. Ruy Diaz (The Cid) founds lazaretto at Palencia.  
1031-1276. Alfonso VI of Castile releases Toledo from Moslem dominion.  
1033. Almoravides (Sahara) subjugate Spain.  
1067. Ruy Diaz (The Cid) usurps rule of Valencia.  
1085. Gerard of Cremona.  
1086-91. Rise of Almohades in Morocco.  
1086-99. Averroes (Cordova).  
1114-87. Moses Maimonides (Cordova).  
1125. Archbishop Raimundo founds a school of translators at Toledo.  
1126-98. Almohades subjugate Spain.  
1139-1205. First public assembly (*Cortes*) held in Léon.  
1140. Hospitals at Burgos founded by monks of Cister.  
1146-72. Moslems defeated at Navas de Tolosa (Andalusia).  
1188. Alfonso VIII founds University of Palencia.  
1212. Reign of Jaime I (The Conqueror) in Aragon.  
1212-14. Alfonso IX founds University of Salamanca.  
1213-76. (confirmed 1243; Papal bull 1255).  
1215. Establishment of Moslem Kingdom of Granada.  
1230-38. Ramón Lull.  
1232-1315. Ferdinand III of Castile frees Cordova, Murcia and Seville from Moslem domination.  
1236-48. Jaime I releases Valencia from Moslem dominion.  
1238. Fernando III establishes chair of anatomy at University of Palencia.  
1240. Arnold of Villanova.  
1240-1311. Alfonso X ("The Wise").  
1252-84. Period of development of national unity.  
1252-1479. Alfonso X founds an Academia de Medicina.  
1255. Revision of Castilian code of laws (*Partidas*).  
1256-65. Attempt of Alfonso X to become Holy Roman Emperor.  
1257-73. Rudolph of Hapsburg chosen Holy Roman Emperor.  
1273. Sicilian Vespers. Pedro III of Aragon dispossesses Charles of Anjou in Sicily.  
1282. University of Lerida (reorganized 1575).  
1300. Alfonso XI of Castile concentrates royal authority at expense of the nobles.  
1312-50. Monasterio de Guadalupe (Estremadura) founded, with medical studio and hospital.  
1322. Jaime II of Aragon acquires Sardinia.  
1324. *Amadés de Gaula* circulated in Spain.  
1350. Massacre of Jews in Seville and Barcelona.  
1391. Insane asylum (*Casa de orates*) at Valencia.  
1409. Diego Cobo composes a surgery in rhyme (*Cirurgia rimada*).  
1412. Juan II decrees tribunal to examine applicants for right to practice medicine.  
1422. Insane asylum at Zaragoza.  
1425. Insane asylum at Seville.  
1436. University of Barcelona founded.  
1450. Catalan revolt.  
1458-70.



1468. Ferdinand of Aragon authorizes dissecting in Hospital de Santa Maria de Gracia (Zaragoza).  
 1469. Marriage of Ferdinand (Aragon) and Isabella (Castile).  
 1471. Quarantine against plague at Mallorca.  
 1472. University of Sigüenza founded.  
 1473. Insane asylum at Toledo.  
 1474. University of Zaragoza founded.  
 1477-8. Printing introduced at Valencia by Lambert Palmart.  
 1470-1516. Isabella sends 400 ambulances to siege of Otrera.  
 1481. Reign of Ferdinand and Isabella.  
 1481-1518. Insane admitted to asylum at Barcelona.  
 1482. Spanish Inquisition.  
 1483. University of Avila founded.  
 1484-9. University of Mallorca founded.  
 1490. Hospital de inocentes (insane asylum) founded at Toledo.  
 1491-1556. Isabella supplies hospital tents at sieges of Alora and Baza.  
 1492. Antonio Amiguet founds a school of surgery in Barcelona.  
 1494-98. Loyola.  
 1497. Discovery of America. Conquest of Granada. Expulsion of Jews. (March 31).  
 1498. Julian Gutierrez publishes treatises on stone.  
 1499. Ferdinand acquires Naples (Southern Italy).  
 1500-1665. Vasco da Gama rounds the Cape of Good Hope.  
 1500. Gaspar Torrella describes syphilis as *pudendagra* (abuse of mercurials).  
 1502. Villalobos publishes poem on syphilis.  
 1503. Pedro Pintor publishes pest-tract.  
 1504. Age of Gold.  
 1505-62. University of Valencia founded. (Reorganized 1582).  
 1506. Forced conversion of Moors (Mudéjares) to Christianity.  
 1507. Juan Almenar discusses treatment of syphilis with mercurials, sarsaparilla, guaiac, sassafras and China root.  
 1508. University of Santiago founded.  
 1509-17. Reign of Philip the Fair and Juana la Loca.  
 1510. St. Francis Xavier.  
 1511-17. Heavy epidemic of plague in Spain.  
 1512. Regency of Ferdinand.  
 1513. *Amadés de Gaula* published at Zaragoza (influence on European fiction).  
 1514. Order of Illuminados organized.  
 1515. Duke of Ureña founds University of Osuna.  
 1516-82. Santa Teresa.  
 1517. University of Seville founded.  
 1518-56. Reign of Charles I.  
 1519. Reformation.  
 1520-21. Charles I of Spain becomes Holy Roman Emperor (Charles V).  
 1521. Cortez conquers Mexico.  
 1522. Charles V founds University of Toledo as Colegio de Santa Catalina.  
 1523. Gaspar Torrella publishes *Consilia* on plague epidemic of 1505.  
 1524-44. Wars between Charles I (Spain) and Francis I (France).  
 1525. Oviedo describes medicinal plants of New World.  
 1526. Defeat of Francis I at Pavia.  
 1527. Luis Vives publishes treatise on unemployment (*De subventionem pauperum*).  
 1528. Gutierrez de Godoy publishes brief for breast-feeding of infants.  
 1529-32. Pizarro conquers Peru.  
 1530. *Constitutio criminalis Carolina* (medical jurisprudence).  
 1531. University of Sahagún founded as a *studium generale* (later transferred to Irache).  
 1532-82. University of Huesca.  
 1533. Andrés Laguna describes the ileocaecal valve.  
 1534. University of Granada founded as Colegio de Santa Cruz (1526).  
 1535. Jesuit order organized.  
 1536-40. Luis Vasseo publishes anatomical tables (4) at Paris.  
 1537. Vittoria (sacred music).  
 1538-40. University of Oñate founded.  
 1539. Ruiz de Isla publishes book on American origin of syphilis.  
 1540-1606. Spanish anatomists theorize about the circulation of the blood.  
 1541. Lobera de Avila publishes treatise on catarrh, gout, stone and syphilis.  
 1542. El Greco.  
 1543-1625. Charles V authorizes publication of first *Index expurgatorius*.  
 1544. Francesco Borgia, Duke of Gandia, founds University of Gandia (Jesuits).  
 1545. Cervantes.  
 1546-1616. Andrés Laguna describes method of excising vesicourethral caruncles.  
 1547. Pedro Gimeno describes the stapes in *Dialogus de re medica*.  
 1548.  
 1549.

1550. Montaña de Monserrate publishes *Anatomia* at Valladolid.  
 1551. Bishop of Osma founds University of Osma as a *studium generale*.  
 University of Lima (Peru) founded.  
 Lohera de Avila publishes first Spanish contribution to pediatrics.  
 Las Casas publishes account of Spanish cruelty to the Indians.  
 1552. Viceroy of Peru founds University of Oropesa.  
 1553. University of Almagro founded (Dominicans).  
 University of Mexico founded.  
 Servetus describes pulmonary circulation.  
 1556. Valverde de Hamusco publishes treatise on artistic anatomy.  
 1556-98. Philip II.  
 1557. Typhus fever (*tabardillo*) appears in Spain.  
 Juan Huarte completes treatise on vocational aptitude (*Examen de ingenios*), published in 1580.  
 1558. Charles V renounces crown of Holy Roman Empire.  
 1562-1635. Lope de Vega.  
 1564. Francisco de la Reina adumbrates circulation of the blood.  
 1565. University of Baeza founded.  
 Porcel described the plague of Saragossa (1564).  
 1567-1604. War against the Netherlands.  
 1568. Archbishop of Valencia founds University of Orihuela (Dominicans).  
 1569-71. Nicolas Monardes publishes accounts of West Indian materia medica.  
 1570. Francisco Bravo describes *tabardillo* (Mexican typhus).  
 Epidemic of sweating sickness in Spain.  
 1571. Philip II wins naval victory at Lepanto.  
 Castilian Cortes requires degree of bachelor of astrology as essential to medical degree.  
 1571-1658. Tirso de Molina.  
 1572. Archbishop of Tarragona founds University of Tarragona.  
 1574. Corrella and Toro describe Spanish typhus (*tabardillo*).  
 Amatus Lusitanus describes valves of azygos vein.  
 1576. Francisco Arceo publishes book on wound treatment.  
 1580. Heavy epidemic of influenza in Madrid and Barcelona.  
 1580-81. Annexation of Portugal.  
 1583. University of Gerona.  
 Diphtheria (*garrotillo*) epidemic in Spain.  
 1584. 6778 students at the University of Salamanca.  
 1584-5. Luis de Lemos publishes commentary on Hippocratic writings.  
 1585-6. Smallpox epidemic in Toledo.  
 1587. Drake burns shipping in the harbor of Cadiz.  
 Trial and execution of Mary Stuart.  
 1588. Defeat and wreck of Invincible Armada.  
 Philip II establishes prescriptive rights of protomedicate.  
 Arceo's book on wound-treatment (1576) translated into English.  
 1589. Gómez Mendez, Bishop of Albarracin, publishes book on massage.  
 1590. Acosta describes Andes mountain sickness.  
 1594. Luis Mercado publishes book on visceral diseases.  
 1595. Lopez de Hinojoso publishes surgical treatise in Mexico.  
 1596. Juan Calvo translates Guy de Chauliac into Spanish.  
 1598-1700. Period of decadence.  
 1598-1621. Philip III.  
 1599. University of Vic founds.  
 1599-1660. Velázquez.  
 1600-1681. Calderón de la Barca.  
 1603. Diphtheria epidemic in Spain.  
 Rodrigo de Castro publishes treatise on diseases of women.  
 1604. *Don Quixote* (Part I) published.  
 1605. University of Oviedo founded.  
 Daza Chacón publishes surgical treatise.  
 1608. Luis Mercado describes diphtheria (*garrotillo*).  
 1609. University of Pamplona founded.  
 1611. Expulsion of Moors.  
 Cascales publishes pediatric treatise.  
 Casales, Fontecha and Villareal describe diphtheria.  
 1613. Luis Mercado publishes treatise on diseases of infants.  
 1614. Vélez de Arciniega publishes account of animals useful to medicine.  
 1615. Rodrigo de Castro publishes book on medical ethics.  
 1617. Second Part of *Don Quixote* published.  
 University of Solsona.  
 Philip III orders reexamination of provincial physicians coming into Madrid (November 7).  
 1618-48. Thirty Years' War.  
 1618-82. Murillo.  
 1619. 32 Universities in Spain.  
 1620. Bonet publishes book on training deaf-mutes.  
 1622-42. Cardinal Richelieu.

1623. Daça de Valdes publishes first account of spectacles.  
 1624. Philip IV creates Estudios de San Isidro.  
 1629. Zacutus Lusitanus publishes book on history of medicine.  
 1635-59. War with France.  
 1637-68. Revolt and independence of Portugal.  
 1638. Zacutus Lusitanus publishes treatise on eye diseases.  
 1639. Countess of Chinchon (Peru) cured of malarial fever by quinine.  
 1640-59. Quinine imported into Europe by Juan Lopez de Vega.  
 1642. Catalan Revolt.  
 1643. Pedro Barba describes medicinal virtues of quinine in *Vera praxis*.  
 Condé defeats Spanish infantry at Rocroy.  
 Dismissal of Olivares.  
 1643-1715. Louis XIV (*Il n'y a pas de Pyrénées*).  
 1645. University of Tortosa founded.  
 1647. Epidemic of plague in Valencia.  
 1649. Epidemic of plague in Seville.  
 1650. 2061 students at the University of Alcalá.  
 1651-60. Velázquez depicts dwarfishism and idiocy by oil-painting.  
 1659. Pyrenees made boundary line between France and Spain.  
 Marriage of daughter of Philip IV (María Teresa) with Louis XIV.  
 Charles II.  
 1665-1700. Intermittent warfare with European powers.  
 1667-97. Nicolas Antonio publishes *Biblioteca hispania nova*.  
 1672. Botanic Garden in Barcelona.  
 1681. Calderon publishes treatise on criminal jurisprudence.  
 1685. Nicolas Antonio publishes *Biblioteca hispania vetus*.  
 1696. University of Mallorca refounded.  
 1697. Limón Montero publishes first account of Spanish mineral waters.  
 1699-1776. Pedro Virgili.  
 1700. Real Academia de medicina y cirugía de Seville founded.  
 1700-46. Accession of Duke of Anjou as Philip V (Bourbon line).  
 1701-14. War of the Spanish Succession.  
 1702-48. Wars with England.  
 1713. Real Academia Española founded.  
 1713-14. Loss of Spanish possessions in Europe.  
 Treaties of Utrecht and Rastadt.  
 1714-48. Isabel Farnese gains Italian possessions for her children.  
 1716. Biblioteca nacional (Madrid) founded.  
 1717-18. Philip V reconquers Sicily and Sardinia.  
 1724. Abdication of Philip V.  
 1723. Real Academia nacional de medicina de Madrid founded.  
 1731. *Efemérides barométrico-médicas matritenses* (first Spanish medical periodical) published.  
 Re-acquisition of Naples.  
 1734-5. War of the Austrian Succession.  
 1740-48. Financial reforms of Enseñada.  
 1743-54. Ferdinand VI.  
 1746-59. Goya.  
 1746-1828. Isabel Farnese acquires duchies of Parma, Plasencia and Guastalla.  
 1748. Notification of tuberculosis made obligatory (Royal decree of October 6).  
 1751. Use of Botanic Garden (Madrid) for instruction.  
 1757. Charles III (Conflict with England).  
 1759-88. Family compact (defensive alliance of Spain with France against England).  
 1761-2. Gaspar Casal describes pellagra.  
 1762. Temporary occupation of Philippines by the English.  
 1762-3. Real Academia de ciencias y artes (Barcelona) founded.  
 1763. War with Moslem states on Barbary Coast.  
 1764-86. Gimbernat devises operation for femoral hernia (Gimbernat's ligament).  
 1768. Museo nacional de ciencias naturales founded.  
 1771. Real Academia de medicina y ciencias (Barcelona) founded.  
 1773. Renewal of Family Compact.  
 1774. American Revolution.  
 1775-83. Ministry of Floridablanca.  
 1777-92. War with England.  
 1779-83. Botanic Garden in Madrid.  
 1781. Biblioteca universitaria (Valencia) founded.  
 1785. Charles IV (Conflict with Republican France).  
 1788-1808. Ronells and Lacaba publish standard textbook of anatomy.  
 1790. Ministry of Aranda.  
 1792. Rise of Manuel Godoy.  
 1792-1808. Real Colegio de Medicina (Madrid) founded.  
 1795. Dismissal of Godoy.  
 1797. Education of nurses begun at instance of Gimbernat.  
 1799. *Anales de historia natural* published.  
 Francisco Pigillem introduces vaccination into Spain.  
 1800.

- 1800-1.      Recession of Louisiana to Napoleon. Tuscany added to Duchy of Parma.
1802.      Joaquin Villalba publishes *Epidemiologia española*.  
Trinidad ceded to England.
1803.      Louisiana Purchase.  
Francisco Balmis introduces vaccination throughout Spanish possessions.
1805.      Nelson defeats French and Spanish fleets at Trafalgar.  
Charles IV approves Regulations for the Surgical Corps of the Army (July 20).
1808.      *Dos de Mayo*. Uprising of Spanish people against Napoleon (May 2).  
Abdication of Charles IV (March 19).
- 1808-14.    Guerilla warfare against Napoleon (Spanish War of Independence).
- 1808-33.    Ferdinand VII.
- 1810-24.    Spanish American Colonies gain independence.
1812.      Democratic constitution.
1813.      Wellington defeats the French at Vittoria.
1814.      Ferdinand VII returns to Spain.
- 1816-17.    Royal orders creating organization (*Cuerpo de Medicos*) of 31 mineral baths.
1819.      Romero performs pericardiotomy.
1821.      Establishment of 23 medical schools in Spain and Colonies.
- 1823-9.     Terrorist struggle between absolutism and insurrection.
1827.      Royal decree uniting medical faculties under a single *Junta* (July 4).
1828.      Protomedicate and Surgeon Generalcy of Army abolished (December 10).
1829.      Ferdinand VII confirms new Regulations of Army Medical Corps (1805).  
Ferdinand VII marries María Cristina of Naples.
1830.      Hysera claims priority in operation of blepharoplasty.  
Dr. Mateo Seoane publishes Spanish-American dictionary.
1832.      Regulations of Army Corps of Pharmacists published.  
Royal order limiting personnel of Medical Corps of Navy to 65.  
Argumosa performs parotidectomy, invents syringotomy, and claims priority in blepharoplasty.
- 1832-99.    Emilio Castelar.
1833.      Coronation of Isabel II.
1834.      Hysern publishes treatise on blepharoplasty.
1835.      *Limpieza de sangre* abolished.  
Argumosa performs excision of the tongue.
1837.      New liberal constitution.
1841.      Marcos Viñals describes origin and course of chorda tympani.
- 1841-6.     Anastasio Chinchilla publishes *History of Medicine*.
1843.      Pedro Mata publishes plan for reorganizing medical education in Spain (confirmed by Royal Order of October 26).
- 1843-68.    Reign of Isabella II (Rule of army generals).
1845.      Academia médico-quirúrgica española (Madrid) founded.  
Corral claims priority in vaginal Cæsarean section.  
Toca claims priority in abdominal hysterectomy for uterine tumor.
- 1845-7.     Mata edits *La Facultad* (medical periodical).
1847.      Real Academia de ciencias exactas (Madrid) found-d.  
Díaz activates reforms in popular and medical education.
- 1847-9.     New plans for reorganization of medical education.
1850.      Special chairs of venereal diseases, dermatology and ophthalmology in Madrid Faculty (Decree of August 28).
1852.      *Historia bibliográfica de la medicina española* (Hernández Morejón) published.
- 1850-66.    Royal orders modifying plan of 1847 for improvement of medical education.
- 1854-83.    Mendez Alvaro edits *Siglo médico*.
1855.      Manuel García invents the laryngoscope.  
Law regulating public health (*Ley de sanidad*, November 28).
- 1856-66.    Marquis del Busto edits *España Médica*.
- 1857-8.     Marquis del Busto founds and edits *Iberia Médica*.
1857.      Laws reorganizing public instruction (*Ley de Moyano*, July 17).
1860.      Rubio y Gali performs first ovariectomy in Spain.
1861.      Reorganization of Real Academia de Medicina (Madrid).  
Rubio y Gali performs hysterectomy.
1868.      New law reforming public education including medicine (*Ley de Ruiz Zorrilla*, October 25-27).
- 1868-78.    Cuban Revolution.
1870.      Assassination of General Prim.
- 1870-71.    Franco-Prussian War (Claims of Leopold of Hohenzollern to Spanish throne).
- 1871-3.     Amadeo of Savoy (Duke of Aosta) as temporary ruler.
- 1871-80.    Olavide publishes treatise on dermatology.
- 1871-83.    Toro edits *Clínica oftálmologica*.

- 1873-4. Temporary Spanish Republic.  
 1874. Rubio y Gali performs first nephrectomy in Spain.  
 1874-85. Alfonso XII.  
 1874-1924. Growth of caciquism (political bosses).  
 1875. Museo Antropológico of Dr. Velasco opened (April 29).  
 1876. New conservative constitution.  
 1878. Academia i Laboratori de ciencias mediques de Catalunya (Barcelona) founded.  
 Ribera claims priority over Estlander (1879) for resection of ribs in empyema.  
 Rubio y Gali performs laryngectomy.  
 1879. Velázquez founds *La Prensa médica de Granada* (*Gaceta médica del Sur de España* 1882).  
 1880. Rubio y Gali founds Instituto de terapéutica operatoria (Instituto Rubio).  
 1881. Rodríguez Mendez founds *Gaceta médica catalana*.  
 1882. Fargas y Roca performs first ovariectomy in Spain for cystic tumor.  
 1884. Hernando y Espinosa publishes report on leprosy in Granada.  
 1885. Instituto nacional de higiene militar (Madrid) founded.  
 1885-1902. Regency of Maria Cristina.  
 1888. Margarit claims priority in interilio-abdominal amputation (Jaboulay, 1894).  
 1892. Academia de higiene de Cataluña (Barcelona) founded.  
 1894. Llorente y Matos founds Instituto de microbiología y seroterapia (Instituto Llorente).  
 1895. Fargas y Roca performs first gastro-enterostomy in Spain.  
 1896-7. Llorente y Matos introduces laryngeal intubation.  
 1897. Ramón y Cajal starts *Revista trimestral micrográfica*.  
 1898. Spanish-American War. Loss of Cuba, Porto Rico and the Philippines.  
 Revival of economic prosperity.  
 San Martín devises osteoplastic amputation at hip-joint.  
 Menéndez y Pelayo becomes director of Biblioteca nacional.  
 1898-1900. San Martín experiments on surgical arterio-venous anastomosis.  
 1898-1931. Renaissance of Spanish literature, art and music.  
 1899. Instituto nacional de higiene de Alfonso XIII (Madrid) founded.  
 Ribera devises posterior mediastinotomy.  
 1902. Sociedad oftálmologica hispano-Americana (Madrid) founded.  
 1902-31. Alfonso XIII.  
 1903. First Spanish congress of ophthalmology.  
 Cajal founds Laboratorio de investigaciones biológicas (Madrid).  
 Ribera describes total gastrectomy.  
 1903-17. Konrad Haeckel catalogues Spanish incunabula.  
 1905. García Tapia describes hemiplegic syndrome allocated to a lesion in the medulla.  
 Echegaray wins Nobel prize.  
 1906. Ramón y Cajal wins Nobel Prize.  
 Barraquer describes progressive lipodystrophy.  
 1908. Asociación española para el progreso de las ciencias founded.  
 1909. Catalanian revolt. Execution of Ferrer.  
 1910. First Spanish Congress of Tuberculosis at Saragossa.  
 1912. General railway strike. Canalejas invokes martial law.  
 1913. Sociedad de biología (Barcelona) founded.  
 1913-14. Cajal publishes treatise on Degeneration and Regeneration of the Nervous System.  
 1914-18. Spain maintains neutrality in World War.  
 1915. Sociedad oftalmológica (Madrid) founded.  
 1917. Barraquer devises method of extracting cataract (phakoeresis).  
 1919. Río Hortega investigates microglia and oligodendria cells.  
 1921. Sociedad española de antropología founded.  
 1923. Instituto Alfonso XIII for cancer research (Madrid) founded.  
 1924. Liga español contre el cancer (Madrid) organized.  
 1925. Sociedad oftalmológica de Barcelona founded.  
 1931. Revolution. Organization of Spanish Republic.

FIELDING H. GARRISON.

# CANCER AS A COMPLICATION OF SKIN DISEASES

(LANTERN SLIDE DEMONSTRATION)

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In this address I shall attempt to give a comprehensive review of the subject of cancer of the skin in its various aspects, and shall corrolate some of my recently published articles.

While the specific cause of cancer is yet unknown, it is now pretty well agreed that repeated irritation and other inflammatory processes in the tissues play a rôle in the excitation of cancerous growths. This is exemplified particularly well in the field of dermatology. Most malignant new growths of the skin, mouth, and external genitalia are preceded by some previous injury or skin condition such as keratoses, syphilis, X-ray burns, tuberculosis of the skin, sebaceous cysts, etc., and there are about twenty skin conditions known to be precursors of such growths. The dermatologist has an opportunity to obtain satisfactory results in the majority of his cases of malignant lesions for the apparent reason that they are of the accessible type in his field. Not only is there opportunity for the growth to be seen early, but correct diagnosis may be made readily by microscopic studies of sections of tissue which can be taken with facility. The importance of taking biopsies for microscopic examination cannot be over-emphasized, especially

so in the differential diagnosis of the indurative and ulcerative lesions, i.e., syphilis, tuberculosis, granuloma inguinale and ulcerating carcinomas. The information often to be gained by histologic study warrants the taking of a biopsy. With the exception of melanomas the removal of a small selected portion of accessible tissue seldom results in any harm. The section should always be taken from the edge of the lesion including a small part of the apparently normal appearing tissue, for if the section is taken from the center of the ulcerating lesion it may show nothing more than granulation tissue. If the diagnosis is made microscopically there will be avoided the all too frequent mistake of treating a patient for syphilis because he had an ulcerating lesion coincidental with a positive blood test; the doctor, therefore, overlooking the fact that the lesion was a cancer in a patient who had systemic syphilis. Also the degree of malignancy and its radiosensitivity may be determined in the case of a neoplasm.

The majority of new growths of the skin if thoroughly treated, result very satisfactorily. The prognosis in this field of work is generally much more favorable than any other, and especially in early cases a very high percentage remain well permanently. If in addition, the general practitioner would learn to recognize those skin conditions which are forerunners of cancer and also to advise patients to eliminate all irritative factors, such as chronic ulcerations, keratoses, over-smoking, ill-fitting dentures, poor oral hygiene, he would be doing important work in the prophylaxis of malignancy. Such organizations as The American Association for Cancer Research and The American Society for the Control of Cancer have helped considerably along the lines of prophylaxis against this disease, and most workers in the field of malignancy are now seeing a large number of their cases much earlier in their course of development than previously. The importance of this work is easily demonstrated by the fact that the results are infinitely more satisfactory when the tumor is treated while yet localized and before metastases have occurred in the adjacent lymphnodes or in other parts of the body.

## LEUKOPLAKIA OF THE MOUTH

Leukoplakia of the mucous membranes of the tongue and buccal mucosa has always been regarded as being potentially dangerous, because it has so frequently been followed by cancer, especially in advanced cases.

Cancer supervention in leukoplakia of the mucous membranes of the mouth, and especially of the tongue, has been reported so frequently, that the laity and even the medical profession have been inclined of late to exaggerate the production of cancer in leukoplakic patches. It should be understood that the greater number of cases of leukoplakia do not eventuate in cancer, especially when all forms of irritation are removed. Large numbers of people have leukoplakia of the mouth for many years without subjective symptoms and with no signs of malignancy. This does not mean, however, that the leukoplakia is not potentially malignant, for when these white patches begin to fissure or to show signs of inflammation they are either beginning to be malignant or are actually cancerous. Bloodgood considers leukoplakia second in importance to bad teeth in the etiology of cancer of the mouth. In a series of 160 cases of cancer of the tongue in men he found leukoplakia in 25 per cent of their number; Mantilla, in studying 566 cases of leukoplakia, reported in the literature by various writers, found that in 32 per cent cancer had resulted. However, for the general run of cases of leukoplakia of the buccal mucosa this percentage seems rather high. Most observers agree that leukoplakia of the tongue and lips is far more prone to become cancerous than leukoplakia of the buccal mucosa and gums. Repeated irritation may result in leukoplakia alone, or in cancer alone, or a combination of both.

*Etiology.*—While much has been written on the causes of leukoplakia of the mouth, there has been great diversity of opinion, especially as to the rôle played by syphilis.

*Sex.*—Leukoplakia shows a striking predilection for the male sex. In Fox's series of 40 cases there were 38 men



and 2 women. Cumston in a collection of over 800 cases in the literature, including 10 of his own, found only 30 females with this condition.

*Age.*—DeForest considers leukoplakia to be most frequent in the fifth and sixth decades, while Eichenlaub's group of 70 cases ranged in age from 28 to 55 years, averaging about 32. Fox's average was 48.

*Syphilis.*—Much has been written to show that syphilis has preceded leukoplakia in a large proportion of cases. Fournier reported that 80 per cent of his patients with leukoplakia had previously been infected with syphilis. His group consisted of 324 patients. In 65 per cent of Fox's cases a previous syphilitic infection was judged to have occurred from the history, Wassermann reaction, or presence of tertiary manifestations. Highman states that "leukoplakia buccalis is almost invariably syphilitic," while Pusey is of the opinion that long-continued irritation will produce leukoplakia, and is not inclined to believe that the association with syphilis is of great significance. Hazen and Eichenlaub conclude that "syphilis represents an accidental rather than a causative factor in this disease." Later Eichenlaub, in reporting an additional series of 70 cases of leukoplakia observed among 349 patients examined by him, found that 3.2 per cent of the entire group had syphilis while 17 per cent of the leukoplakia group had syphilis. Eichenlaub's report gives one the impression that he does not believe syphilis plays an important rôle in the causation of leukoplakia.

Elliott and Stookey in a study of the oral mucosa of 50 patients with neurosyphilis found 49 patients with definite leukoplakic patches.

*Tobacco.*—There appears to be a general agreement among the various writers that users of tobacco, especially smokers, are the patients who are most prone to leukoplakia. Butlin forty-five years ago stressed the importance of smoking as one of the important causes of leukoplakia. Since then other writers have supported his ideas. Of

Fox's 40 cases, 35 were habitual smokers. Max Joseph considers that the "severity of leukoplakia depends upon the greater or less use of tobacco." Perhaps the reason that this condition is observed so much more frequently in men is because the latter are much greater users of tobacco.

*Teeth.*—Hazen and Eichenlaub emphasize the fact that "rough teeth by causing mechanical irritation inaugurate the disease in the vast majority of cases." Bloodgood also notes the frequent association of bad teeth with leukoplakia.

*Alcohol and Food.*—Various writers mention that strong alcoholic beverages and highly seasoned foods are probably an exciting cause of leukoplakia in some cases.

*Gastro-Intestinal Disturbances.*—Montgomery is of the opinion that "the chief cause of leukoplakia is syphilis, next tobacco, and finally a chronic catarrhal and therefore irritable state of the mucous membranes usually found in connection with chronic fermentative intoxications along the alimentary tract."

I have observed a patient in private practice, the wife of a dentist, who has repeatedly had patches of leukoplakia on the tongue and buccal mucous membranes. The appearance of these patches gave no symptoms and the possibility of a drug eruption was excluded. When the patient was first examined two years ago this history was given us by her husband. Since then we have been able to confirm his observation that the patches disappeared without any local treatment during the time when the patient's digestive system was apparently functioning normally.

*Comment on etiology (race and occupation).*—There is no doubt that syphilis precedes leukoplakia often enough to be considered an important predisposing factor. However, it should be fully understood that *leukoplakia is in itself not a syphilitic process*, for microscopically this condition does not give the picture of syphilis, but has the same structure as leukoplakia in non-syphilitic patients. Also it has been

definitely observed that the condition does not improve under anti-syphilitic treatment, whether associated with syphilis or not.

I believe that whether or not the patient has had a previous syphilis (excluding active syphilis), some form of local irritation is usually the exciting cause of leukoplakia, the most important irritant being tobacco. This year I have had two patients who presented slightly infiltrated extensive white patches on the tongue and buccal mucosa, one with a history of seven years', the other two years' duration, both of whom had been heavy smokers over a period of years. By discontinuing all forms of tobacco and with the use of a mouth-wash of ordinary milk of magnesia, the leukoplakia in both of these patients had almost entirely disappeared. There were no evidences of syphilis and the teeth were in good condition.

While leukoplakia buccalis may also be caused by other irritants such as necrotic or jagged teeth, alcohol, the chewing of betel-nuts among Orientals, very hot or highly spiced food and gastro-intestinal disturbances, I agree with the majority of the writers who consider that syphilis and tobacco are the most important etiological factors, and that where syphilis had existed or does exist, smoking should be reduced or prohibited.

*Treatment.*—In the treatment of leukoplakia buccalis prophylaxis is the all-important factor. The prevention or removal of all possible irritants such as those mentioned here in the discussion of the etiology is advisable. Anti-syphilitic treatment in syphilitic patients suffering from leukoplakia benefits the true syphilitic condition but fails to cause a disappearance of the leukoplakia. It may, however, make the tissues less susceptible to the development of cancer.

In reference to the removal of irritants it must be borne in mind that the vast majority of people who subject their oral mucosa to irritation by smoking, alcohol, spicy foods, very hot and very cold foods, etc., do not present leuko-

plakia. Direct injuries must be avoided as from jagged or necrotic teeth, improper dentistry, biting of the tongue or mucous membranes, the use of hot clay pipes on the lips or tongue, and outright inveterate smoking. There are certain persons whose mucous membranes are more sensitive than those of the average, just as there are some who are more prone to eczematous eruptions of the skin than others. In patients with an apparently more sensitive mucous membrane, abstinence from all forms of irritants and the avoidance of gastro-intestinal disturbances is advisable.

For the ordinary mild case of leukoplakia discontinuance of all irritants, with a bland mouth-wash, is sufficient for improvement. The condition, however, recurs promptly when these measures are not followed. Where the patches are more resistant and show the slightest tendency to proliferate or to fissure, they should be promptly destroyed by means of electrocoagulation. Where the leukoplakia is less infiltrated and removal is desired, electrodesiccation is the treatment of choice. While leukoplakia may recur under this treatment, it is less likely to do so if strict attention is paid to avoidance of irritants.

I shall mention the following therapeutic agents only to condemn them; radium, roentgen rays, carbon dioxide snow, chemical caustics of all kinds, and electrolysis.

### SYPHILIS

The leukoplakia which occurs on the mucous membranes of the mouth, tongue and oral cavity in syphilitic patients has long been recognized as being subject to malignant degeneration. This subject was considered under leukoplakia of the mouth.

Tertiary syphilitic manifestations on the mucosa of the mouth and particularly of the tongue play an important rôle in precipitating carcinomatous growths. A conservative estimate of the numerous recorded cases of cancer of the tongue indicates that this condition is associated

with tertiary syphilis in about 60 per cent of the cases. The syphilitic manifestations may be in the form of gummas, interstitial glossitis, and leukoplakia. The malignant tumors often develop in scars from previous syphilitic ulcerations of the mouth.

The importance of looking upon all infiltrated ulcerations of the mucous membranes of the mouth as being possibly cancerous should be emphasized. Only too often has there been delay in the treatment of mouth carcinomas due to the fact that the patient had serologic evidence of syphilis. Much time may be lost in treating such a patient for his syphilis, while the more serious condition is the cancer, which is so often present instead of the supposedly syphilitic ulceration. Then again there may be a broken-down and ulcerating gumma with cancer supervention. In addition to the time lost in treating the patient for syphilis who has cancer of the mucous membranes there is also another point to be considered. This is the fact that most syphilologists believe that cancerous growths on a syphilitic base are stimulated to more rapid growth by arsenical therapy.

*It is considered imperative that all persistent ulcerations of the mucous membranes be studied microscopically to determine the presence of carcinoma regardless of serologic or other evidences of syphilis.* The tissue to be studied should include the borders of the ulceration, for sections taken from the center of such lesions often show nothing but granulation tissue.

Our only hope at the present time for decreasing the mortality from cancer of the mouth is in its very early recognition, so that therapy may be instituted at once.

The following two cases from our collection illustrate the importance of the above:

CASE 1—J. S.—Male, aged 40 years, was first seen December 31st, 1927. There was present a slightly infiltrated ulceration on the anterior third of the left margin of the tongue. He gave a history of a syphilitic infection twenty

years previously which had been treated by intramuscular injections. The lesion of the tongue was of six months' duration and began as a pea-sized ulcer. The patient then consulted a physician, who after finding a positive Wassermann blood reaction at once instituted anti-syphilitic therapy which was continued for months, during which time the tongue lesion became progressively larger and the patient lost weight rapidly. A section taken from the ulcer for microscopic study showed a prickle-cell cancer on a gummatous base.

CASE 2—E. K.—Aged 43 years, appeared with a dime-sized superficial ulceration on the right anterior third of the tongue. This had been present for three months. The blood Wassermann was strongly positive. A biopsy revealed a rapidly infiltrating prickle-cell carcinoma.

Although carcinoma has been observed in both syphilitic ulcers of the glabrous skin and the scars left by them, this incidence is comparatively rare.

### ROENTGEN-RAY AND RADIUM SEQUELÆ

These two agents may produce the same deleterious effects on the tissues. They may do so by one massive overdose or by the accumulation of too great a number of repeated small doses. Sequelæ may not appear for several years following the discontinuation of roentgen-ray or radium therapy. These sequelæ may appear in the following order: pigmentation, telangiectasia, keratoses, ulceration, and in some cases cancer. An ulceration can occur within a few months after a single large overdose of roentgen rays, and cancer may soon develop in such ulcers. The prickle-cell cancer is the type invariably found, and as a rule begins on a keratosis.

*Treatment.*—It is recommended that radical surgical excision be instituted as early as possible when ulcerations appear as the result of roentgen rays or radium. All radium and roentgen-ray keratoses should be destroyed by some form of high-frequency current such as electro-

coagulation. We cannot see the rationale of treating roentgen-ray and radium sequelæ with the same agents which have produced them. Although such therapy is commonly used, I feel that it is strongly contra-indicated.

### MOLES.

Although any mole may be the site of malignant change, usually only certain clinical types are apt to develop into melano-carcinomas. This type is the bluish-black or slate-black mole, which as a rule is non-hairy. It may be flat or slightly raised. When flat and level with the surface of the skin it has been called "malignant lentigo." In the mole, which is a potential melano-carcinoma, both the pigmented and non-pigmented nævus cells are of ectodermal origin. This type of cancer often rapidly metastasizes, and the disseminated tumors, while usually pigmented, may be without pigment.

Although Dawson and others doubt the existence of true melano-sarcomas, they have been reported as arising from moles where the nævus cells were located in the cutis and without apparent derivation from the epidermis—nævus cerebelliformis; blue nævus (Bloch).

However, most moles are essentially benign. A proof of this is that practically every person has one or more moles, the vast majority of which never give rise to cancerous growths. The moles which are not inclined to malignancy may be conveniently classified clinically as follows:

1. Non-pigmented moles:
  - a. Fibroma molle.
  - b. Fibroma durum.
2. Pigmented moles of benign type:
  - a. Hairy mole.
  - b. Raised brown mole.
  - c. Verrucous mole.

The benign mole is distinctly a cutis lesion having no apparent connection with the epidermis.

*Treatment.*—The benign moles when hairy should have the hairs destroyed by electrolysis. Frequently the mole disappears without further treatment. If not, the remainder may be removed by various methods, their efficacy being in the following order: Carbon dioxide snow, trichloroacetic acid and electrodesiccation. Radium and roentgen rays are contra-indicated in the treatment of pigmented nævi. The treatment described for pigmented hairy moles after the hair has been removed by electrolysis applies also to the non-hairy but benign type of mole.

The treatment of the slate-black or blue-black moles requires serious consideration. They are always a potential source of danger, and the prognosis even with the most radical therapy is uncertain. We are of the opinion that if they are located in areas not subject to irritation and if they have not shown signs of growth, it is safer to leave these nævi untreated. Microscopic studies show that the size of the nævus on the surface of the skin may be misleading as to the actual extent in the tissues. I have seen cases where the pigment-bearing cells were found inches away from the small papule on the surface, and where deep down in the fat following along the walls of the blood-vessels and nerve-fibres, pigmented cells could be found on microscopic study. These latter deposits were associated with apparently quiescent moles. When there is an indication for the removal of such nævi, the following procedure should be followed: wide removal by some surgical method preferably the high-frequency knife, followed by electrocoagulation should be instituted before these moles show signs of growth or immediately at their first sign of growth. The excision should be made in the form of a cone the base of which is deep in the underlying tissues. Radium or roentgen rays have been as a rule unsatisfactory when used alone for the treatment of melanomas due to their marked radioresistance and because of the tremendous destructive doses necessary for the removal of these lesions. Irradiation in smaller doses may be useful following the above surgical removal.



## SENILE KERATOSES

Senile keratoses (erroneously called senile keratoma\* by some authors) are lesions which occur in individuals usually past sixty years of age, but occasionally are seen in younger people and are located chiefly on the temples, other parts of the face and neck, and back of the hands, i. e., the exposed surfaces. Senile keratoses are most commonly seen in those who are continually exposed to the elements and hence are far more frequently found in men than in women. Senile keratoses are not frequently seen on covered portions of the body. They are flat or slightly elevated, pea to dime-sized lesions, usually multiple, yellowish brown to dark grey or greyish black in color. Their surface is covered with dry, firmly adherent scales or crusts. On palpation they are embedded, sharply margined, firm and rough. Upon removal of the horny covering with the curette one sees numerous small conical projections on their under surfaces, which had fitted into the depressions (dilated follicular orifices) which are thus disclosed. When the crust is removed, the surface exposed is moist and red, often slightly hemorrhagic and superficial ulceration may occasionally be present. In the uncomplicated case of senile keratosis there are as a rule no subjective sensations and generally there is no clinical evidence of inflammatory reaction. Usually these lesions are accompanied by other evidences of senile changes in the neighboring skin, e. g., dryness, freckling, hyperpigmentation, telangiectasia and wrinkling. The clinical diagnosis of the lesions on the back of the hands presents no difficulty. This however is not the case with the face lesions, some of which might look identical with seborrheic keratoses, particularly in patients of advanced years. Two of our face lesions which had been clinically diagnosed senile keratoses proved to be seborrheic keratoses microscopically.

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\*Keratoma—strictly speaking meaning a tumor of the horny layer and applicable only to a cutaneous horn.

The histologic findings in uncomplicated cases of senile keratoses are fairly uniform and present a definite microscopic picture.

### SEBORRHEIC KERATOSES

Seborrheic keratoses\* are found on the chest, interscapular region, about the waistline and on the face. The chin and submental regions are rarely involved. I have never seen a seborrheic keratosis on the back of the hands. These lesions are practically always multiple and may vary from three or four to one hundred or more. They are sharply circumscribed, rounded or oval, flat elevations varying in size from a pea to a silver quarter. As a rule they are covered with greasy friable scales and are grey, yellow, brown or black in color. They present a granular surface which is raised one to three mm. above the level of the skin, and usually the whole lesion is freely movable over the underlying skin; this explains why they are so readily removed with the curette. On removal one finds a small, wart-like projection in the center of the underlying skin. Often small black points or dots are present on the smooth elevated surfaces; these correspond to the follicular openings. Uncomplicated cases do not present clinical inflammatory reaction. Whatever the etiology of seborrheic keratosis is, I agree with MacLeod, Sutton, Pusey and Unna, and others who believe that they bear some relationship to and are found most often in association with a greasy seborrheic skin. They are characteristically slow in evolution, do not tend to disappear spontaneously, and are seen as a rule in individuals past forty years of age, e. g., they occur more often in a younger group of individuals than do senile keratoses.

Subjective symptoms are usually absent, although there may be itching or a sense of irritation at times.

\*Synonyms occasionally used are *verruca senilis vel plana*, *verruca seborrheica*, *keratosis pigmentosa*, *nævi seborrheica* (Unna), *acanthosis verrucosus seborrheica* (Walch), *senile verruca* (Freudenthal).

When seborrheic keratoses involve the face it is sometimes impossible to differentiate them clinically from the lesions of senile keratoses, especially in those lesions that take on a warty appearance and are covered with tightly adherent scales.

### SEBORRHEIC AND SENILE KERATOSES SUSCEPTIBILITY TO MALIGNANT CHANGE.

These two conditions should be separated because they vary in importance as regards their relationship to malignancy.

The clinical course of senile keratosis varies. The lesions do not disappear spontaneously, and may persist unchanged for months and even years. Hazen estimates that about 5 per cent of them undergo epitheliomatous transformation. They either ulcerate superficially or the lesion enlarges gradually and becomes elevated with a marked hyperkeratotic covering. At times they may assume a papillomatous appearance. When such changes occur the growth is undoubtedly undergoing epitheliomatous development if it is not already a prickle-cell epithelioma. The appearance of an inflammatory border about a senile keratosis which has recently shown a tendency to enlarge, is one of the first clinical signs of malignancy. Also when a senile keratosis becomes verrucous, it is a carcinoma. The type of senile keratosis which has a tendency to become verrucous has been called the acanthoid or verrucous type of seborrheic keratosis by Sutton. Senile keratoses therefore are extremely important precancerous lesions. Their histopathology, is such that when and if a carcinoma results it is always of the prickle-cell variety. The fact that seborrheic keratoses rarely if ever occur on the back of the hands (I have never observed one), while such a location is the favorite site of senile keratoses, would seem to explain the clinical finding that the vast majority of all cancerous lesions of the hands are prickle-cell epitheliomas.

Seborrheic keratoses of the face not uncommonly give rise to epitheliomas. On the basis of the histologic find-

ings, when such a malignant change does occur, the resulting epithelioma is of the *basal-cell variety*.

### RESUME

(1) Senile keratoses and seborrheic keratoses are two distinct disease entities clinically and pathologically. A clinical differentiation is not always possible when these two conditions occur simultaneously on the face.

(2) Senile keratosis is distinctly a precancerous condition. While such lesions may exist for many years without undergoing malignant changes or may never undergo such a change, yet if it does occur the epithelioma is always of the *prickle-cell type*.

(3) Senile keratoses may occur on other than exposed portions of the body and recently I have seen two instances, one of which was on the penis.

(4) Seborrheic keratosis may develop into an epithelioma. When it does, it is usually on the face and is always of the *basal-cell variety*.

### KRAUROSIS VULVAE

Briesky in 1885 in an epochal contribution gave the name "kraurosis" to the following syndrome: Retraction of the tissues of the female external genitalia (kraurosis) with whitening of the integument (leukoplakia). In greater detail these changes consisted of an atrophic and sclerosed condition of the skin of the vestibule and the labia minora, together with the frenulum and prepuce. The skin in areas where retraction was most pronounced was white, dry and covered in places with a thick and toughened epidermis. The adjacent skin was of a dry, glazed, washed-out, whitish appearance (leukoplakia). Since that time there have been various contributions to the literature on this subject. Some authors regard kraurosis and leukoplakia as two distinct and unrelated diseases (Jayle and Bender, Thibierge, Berkeley and Bonney); others believe kraurosis and leukoplakia to be dif-

ferent manifestations of an identical pathological process. Graves and Smith, in a most thorough and recent review of the subject, presented clinical and histological evidence that "kraurosis and leukoplakia used in the classic sense are phases of an identical process."

Kraurosis vulvae, in its classical sense, has been regarded since its recognition as a precursor of cancer. Jayle says "leukoplasic kraurosis is complicated with cancer in about one-tenth of the published cases." Smith, who made a histological study of 21 specimens of vulvar cancer, found leukoplakia 16 times and kraurosis 14 times. He felt that his studies "proved sufficiently well that cancer of the vulva is at least in the majority of cases preceded by leuko-kraurotic changes."

*Treatment.*—When permanent skin changes of a leukoplakic nature are present it is useless to temporize with various local applications for the condition requires surgical treatment. A partial or complete vulvectomy should be done followed by the plastic work necessary for good genital drainage. Such surgical therapy in most cases gives permanent relief from symptoms and is a preventative against future cancer. Roentgen-ray and radium therapy not only is useless but contra-indicated in the treatment of kraurosis vulvae.

### LUPUS VULGARIS

Lupus vulgaris as a precursor of cancer was reported in the literature by Hutchinson, Bayha, Hebra, Kaposi and others over forty years ago, and therefore before the discovery of roentgen rays and radium. Numerous investigators have contributed reports of lupus vulgaris carcinoma. There has been much controversy concerning its increase as a result of the use of roentgen rays and radium in the treatment of lupus vulgaris. Some observers are of the opinion that doses of roentgen rays well within safe limits, as we understand them, may precipitate cancerous growths in this disease. Others feel that roentgen rays or radium will cause cancer in lupus vulgaris only

as a result of definite overdoses given either massively or fractionally. In other words, the latter class of cases would belong to the group of roentgen-ray and radium carcinomas.

Lupus cancer most often begins in a lupus lesion or scar of many years' duration. When once started the cancerous growth is rapid, and although the prickle-cell carcinoma is the usual type met with, metastases are not frequent. Hutchinson did not note gland metastases in his 12 cases. Walker, fourteen years later, remarked that metastases were exceptional. Vilanova, however, recently reported a case in which there were fatal metastases. Pautrier's case of lupus vulgaris was interesting because of the occurrence of multiple foci of basal-cell epithelioma in a lupus patch.

Lupus vulgaris cancer is not simply a cancer of scar tissue in the same sense as one appearing on the scar of a burn, for here the process is a very slow one, while lupus vulgaris cancer is usually acutely destructive locally. Hutchinson, who believed this, has numerous supporters. Although Gaucher and Stumpke have blamed roentgen rays as a cause of epitheliomatous growths developing on lupus vulgaris, I am in accord with Lonste and MacKee that the technique of radiotherapy rather than the agent is to be blamed. Lieberthal, Zeisler, Pusey, Anthony, Hyde and Ambrossoli have all reported cases of epithelioma on lupus vulgaris in which roentgen rays or radium had not been used.

Norman Walker reported that 31 per cent of his cases were under forty years of age. In describing the cancer of lupus vulgaris he remarked that it was often papillomatous and unaccompanied by hyperkeratoses, which latter are found in roentgen-ray cancer.

Leloir estimated the frequency of cancer as about 2 per cent in lupus vulgaris cases. Du Bois Havenith found 5 cases of carcinoma in 118 cases of lupus vulgaris. This percentage is probably high, although Ormsby estimated

that cancer occurs in from 2 to 4 per cent of the cases; and Darier and Pollitzer place its frequency at 4 per cent.

Wild noticed that lupus vulgaris cancer was of two clinical types: first, the fungating type which spreads rapidly and forms a growth of considerable size, and the second which breaks down with deep ulcerations. Sequeira found prickle-cell growths in 13 out of 14 cases of lupus vulgaris cancer.

### SUMMARY

(1) The incidence of cancer in lupus vulgaris varies between 1.5 and 4 per cent.

(2) Prickle-cell carcinoma is the type usually found.

(3) The face lesions of lupus vulgaris are those most likely to become malignant.

(4) The development of epithelioma is more frequent in the male, although lupus vulgaris is more common in the female.

(5) While carcinoma usually occurs in cases of long-standing lupus vulgaris, this complication is seen rather frequently in patients under forty years of age.

(6) I believe that the number of cases of lupus vulgaris cancer has been increased by the use of roentgen rays and radium, *but only as a result of over-dosage.*

(7) Metastases have been comparatively infrequent. This might be explained on the basis that the cancer is growing in an already fibrotic and scarred tissue in which the lymphatics have been practically obliterated.

### OCCUPATIONAL KERATODERMAS

There have been numerous reports of cancer of the skin due to occupational exposure to various chemicals. These malignant growths, which usually are of the prickle-cell type, are invariably preceded by keratoses. What percentage of workers in industries develop keratoses and

what percentage of these develop cancer cannot be judged from the reports in the literature or from available statistics.

O'Donovan, who has reviewed this subject, considers "tar carcinoma" to be the most frequent occupational cancer in England. Tar contact may occur in the following occupations: tar distillers, gas-works stokers, creosote workers, tar road sprayers, chimney sweepers, paraffin workers, benzine distillers, anthracene labourers, coal oil workers, pitch handlers, lamp-black workers, aniline dye workers and sprinklers of soot (gardeners).

"Arsenical cancer" of occupational origin: In this group are included sheep-dip workers who come in contact with much arsenic dust. Arsenical keratoderma and cancer may also occur in workers with Paris green (rat poison), wall-paper makers, smelters of ores, such as tin, nickel, lead, copper, iron, and silver, furriers, tanners, farmers using arsenic sprays and in taxidermists.

Other workers in which keratoses and resulting cancers occur are handlers of heavy grade mineral oils, shale oil workers, mule spinners (scrotal cancer), brewers, and workers with roentgen rays and radium. Here also may be mentioned that cancer has been frequently reported in Tibetans, who are in the habit of wearing little hot "stoves" against their abdomens in cold weather.

#### ARSENICAL KERATOSES

Here will be considered only the keratoses resulting from the internal use of arsenic. Hutchinson, as far back as 1887, recognized the possibility of cutaneous cancer following keratoses due to the long-continued internal use of arsenic and reported several such cases.

Some 60 cases or more of cancer following arsenical keratoses are present in the literature. In most instances the squamous-cell type of cancer was noted.

Practically all observers agree that epithelioma may follow cutaneous hyperkeratoses which are the result of



arsenic taken internally. What rôle does the arsenic play in the production of cancer and what is the *modus operandi*? Regarding this point, Wile says that "the occurrence of epithelioma following the use of arsenic is in all probability the result of several factors; in the order of their importance they are:

"(a) The chemical action of arsenic acting as a protoplasmic irritant, leading to the production of tissue especially liable to malignant degeneration.

"(b) The irritation and trauma to which precancerous lesions (keratoses) are constantly subjected.

"(c) The occurrence in most of the subjects of arsenical cancer of a pre-existing chronic disorder and abnormality of the epithelial covering.

"(d) In addition to these factors, the suggestion that in arsenical cancer the changes may be due to chemical alteration of the cell rendering it more sensitive to solar activity seems worthy of further thought and investigation."

#### RESUME

(1) Arsenic internally, particularly pentavalent arsenic, may cause chronic skin eruptions upon which epitheliomas may develop.

(2) Keratoses usually precede the cancerous growths.

(3) The squamous-cell cancer is usually found in these cases.

(4) It is not known whether the direct chemical action of the arsenic on the cell is the exciting factor in the cause of the cancer, or irritation of tissues already altered by arsenic.

(5) Physicians should warn their patients against the repeated internal use of arsenic. This remedy should not be prescribed too freely.

(6) Arsenical keratoses may appear within six months

of the taking of arsenic or they may not occur until many years have elapsed.

(7) Most keratoses following arsenic appear on the hands and feet, although occasionally they occur on the trunk and other parts.

(8) Carcinoma most frequently follows arsenical keratoses on the hands or feet.

(9) As shown by Fouss, in more than one-half of the reported cases the carcinomatous foci were multiple.

### SEBACEOUS CYST

Ricker and Schwalbe reviewed the literature up to 1914 and found 43 cases of sebaceous cysts in which carcinoma developed in the cyst walls. In 17 of these there was ulceration. The malignancy was seen mostly in cysts on the face and scalp. While the age incidence varied between 20 and 70, most of the malignant growths occurred in persons over 60 years of age.

Caylor in a recent report of 236 cases of sebaceous cysts seen at the Mayo Clinic found 12 instances where there was a malignant growth. Most of his cases of malignant change were in lesions on the head and neck. The ages of these patients varied from 38 to 82 years. Four of the cases presented ulceration. Caylor found on microscopic study that 10 of the epitheliomas were of the squamous-cell type and two of the basal-cell variety.

I have seen this complication twice during the past years. One patient was a woman, aged 81 years, who had a sebaceous cyst in the left temporal region for twelve years. This had grown slowly in size until about one year ago when an ulceration appeared on the surface. On examination the patient presented a globular swelling extending from the outer edge of the left eyebrow to the hair-line of the temporal region. This globular mass was ulcerated on the surface, was dry and had a ragged edge. The entire mass was excised by means of the high-fre-

quency cutting current. A microscopic study revealed a large sebaceous cyst, and growing in its wall was a prickle-cell carcinoma which had presented itself as an ulceration on the surface.

### CHRONIC ULCERS AND FISTULAE

While chronic ulcers of the legs associated with varicose veins and often called varicose ulcers are frequently seen in persons at the age when carcinoma is most frequent (40 to 60 years), yet cancer supervention in these ulcers is extremely rare.

When one considers that many thousands of cases of varicose ulcers have been observed in clinics and private practice in the last fifty years, and that a search of the literature reveals some sixty odd cases of cancer supervening on such ulcers, it can be concluded that this complication is most infrequent.

Volkman, Gottheil and Knox in comprehensive articles on this subject emphasize this surprising fact. They point out that in varicose ulcers all the conditions are seemingly favorable for the development of cancer such as a low-grade inflammatory process, chronicity, irritation from various stimulating applications used in treatment, the age of the patient, associated circulatory disturbances, foul and necrotic secretions and the frequency of years of neglect. The average duration of the ulcer preceding the development of the cancer was twenty years. The squamous-cell variety of cancer was found in every reported case.

A consideration of the above facts leads one to the following questions:

(1) If the above conditions were found on the mucous membranes, such as the mouth and tongue, one would expect a cancerous growth in a comparatively short time. What is the reason, therefore, for the extreme rarity of malignancy in the many thousands of varicose ulcers?

(2) Does the impaired circulation act as an inhibiting influence on the development of cancer?

(3) Is there a comparative local tissue immunity?

There have been reported about 50 cases of carcinoma following fistulae, most of which have been about the ankles and calves. One of our own cases occurred in the anal region, following a long-standing anal fistula. The growth was rapid, and metastases occurred with subsequent death. Fistulae occurring on the lower extremities are usually associated with a long-standing osteomyelitis, sinus formation and subsequent ulceration followed by carcinoma.

There have been a few isolated reports of cancerous growth in decubitus ulcers and also in pellagrous ulcers of the skin. These, however, have been extremely rare. Bloodgood reported his case of cancer in a lesion of blastomycosis. This also is a rarity. Wise mentions the occurrence of cancer in the ulcerations that may be present in long-standing atrophic patches of acrodermatitis chronica atrophicans on the legs.

### LUPUS ERYTHEMATOSUS

Carcinoma occasionally occurs in lupus erythematosus, but much less frequently than in lupus vulgaris. From a fairly complete review of the literature the following conclusions may be drawn:

(1) Carcinoma may develop in untreated active lupus erythematosus lesions.

(2) The combination or association of cancer with lupus erythematosus may be purely a coincidence.

(3) Carcinoma may develop in old scars of previously untreated lupus erythematosus.

(4) Carcinoma may develop in lupus erythematosus which previously had been treated by irritants such as roentgen rays, radium, chemical applications, etc.

(5) With the exception of one or two isolated cases, reported as basal-cell epitheliomas (and these are ques-

tionable), the carcinoma complicating the lupus erythematosus was always of the prickle-cell type.

(6) In nearly all of the cases reviewed this complication occurred in areas about the face and scalp.

(7) Its occurrence is usually in long-standing lesions.

(8) While a review of the literature reveals approximately 60 cases of carcinoma complicating this disease, one gleans from reading discussions that many cases have been observed but not reported.

(9) While Wander has reported four carcinomas in his group of 110 lupus erythematosus patients, others have not seen it as frequently.

(10) Since the carcinoma which develops on a lupus erythematosus is usually of the prickle-cell type, this complication is serious.

### CICATRICES

It is well known that carcinomas have arisen in old scars of lupus vulgaris, syphilis and lupus erythematosus. If we exclude these diseases the occurrence of cancer in old scars is not frequent. Scars resulting from any form of trauma may be a menace, but small superficial scars and keloids practically never give rise to cancer. Large scars resulting from third-degree burns are those most likely to develop carcinomas. These cancers are usually of the squamous-cell variety. Treves and Pack recently published a thorough and painstaking study of the development of cancer in burn scars. They gave an analysis and report of 34 cases of skin cancer which resulted from various types of thermal injuries.

### CUTANEOUS HORNS

Cutaneous horns are peculiar horny growths, which are characterized by excessive and progressive keratosis. They are most frequently found on the scalp and face, and less often on the buttocks, penis, scrotum and nails. Lebert

collected 109 cases of general distribution and Wilson 90 cases. Cutaneous horns are usually single, but may be multiple. They vary in size from small pointed nodules to large excrescences. Rodriguez reported a horn in the scalp 14 inches in circumference. In the beginning the growth is usually rapid but later becomes slow and intermittent, and after reaching a certain size usually remains quiescent. The horn may then become permanent or detached followed by the regrowth of a new horn. Owing to the irritation caused by the presence and movement of the horn, the base of which is entirely cutaneous and movable, the warty base readily assumes malignant changes. Lebert found this occurrence in 12 per cent of his cases. Cutaneous horns and epitheliomas have the same favourite sites, i. e., areas of predilection for seborrhea. Sutton is of the opinion that there is a distinct relationship between the "wart" form of seborrheic keratosis and certain types of cutaneous horns. A review of the literature readily convinces one that epithelioma is a frequent complication of cutaneous horns.

### BOWEN'S DISEASE

Since Bowen described an unusual form of dyskeratosis as a "precancerous dermatosis," much controversy has arisen as to the correctness of his assumption that the condition was precancerous rather than cancerous. Lately this subject was reviewed by Fraser and Wise, who consider this condition an intra-epidermal carcinoma. I shall use their material freely in drawing the following conclusions:

- (1) Microscopic evidence proves Bowen's disease to be a distinct entity with histological features peculiar to itself and indicative of intra-epidermic carcinoma.

- (2) Many cases reported as Bowen's precancerous dermatosis are examples of a peculiar form of epithelioma usually of the basal-cell variety, but at times prickle-cell and more rarely of the mixed basal and prickle-cell type.

(3) This error was made because dyskeratosis occasionally occurred in certain lesions of so-called multiple superficial flat epitheliomas of the skin.

(4) A definite diagnosis of Bowen's disease cannot be made on clinical evidence alone but requires microscopic study.

(5) Up to 1925 only 12 of the 34 cases reported as Bowen's disease had stood the test of clinical and histological scrutiny.

(6) There is evidence (a) that the lesion in Bowen's disease may remain indefinitely within the confines of the epidermis, or (b) it may break through the basement membrane and become transformed into an infiltrating carcinoma.

(7) The primary and essential change in the Bowen lesion is not a dyskeratosis, but a disturbance of epithelial growth in which the cells have undergone the changes of malignant neoplasia.

(8) As Bowen's disease is cancer, the term "precancerous" as applied to the lesion by Bowen and Darier is illogical and should not be used.

(9) Other types of carcinoma may arise independently and may be associated in the same person having the Bowen lesion.

(10) Bowen's lesion occasionally becomes an infiltrating carcinoma of the squamous-cell type.

(11) If one restricts the meaning of the term "carcinoma" to an infiltrating neoplasm, Bowen's lesion is not a carcinoma. If, on the other hand, the definition of the term can be extended to include a lesion in which the cells have undergone all the changes constituting malignancy, but remain in situ, there is justification for designating the Bowen lesion as an intra-epidermal carcinoma.

(12) The so-called Bowen disease must be treated with the same thoroughness as the resistant type of flat epithelioma of the skin.

## PAPILLOMA OF THE TONGUE

Papilloma is one of the commonest of the simple tumors of the tongue and may appear at all ages. Although occurring in other areas it is usually located on the dorsum or papilla-bearing area. Occasionally papillomas are found on the floor of the mouth, inner surfaces of the cheeks, lips, and on the palate. They may be single or multiple. Microscopically they resemble a common wart. They may be congenital, but most frequently seem to be caused by various forms of irritation, such as tobacco and bad teeth. Many observers are in general agreement with Ewing who states: "While some papillomas long remain benign and enjoy a limited growth, there is a strong tendency towards malignant change, which is indicated by increasing growth, induration and fixation of the base and ulceration." When cancer occurs it is of the squamous-cell variety.

## XERODERMA PIGMENTOSUM

This rare malady most often begins in early childhood, and is considered to be due to an inherited peculiar susceptibility of the skin to the sun's rays and other forms of light. The exposed areas of the body are those first affected. This disease is characterized by a syndrome of symptoms not unlike that of chronic radiodermatitis, i. e., hyperpigmentation, telangiectasis, sclerotic and atrophic whitish areas, keratoses and malignant growths. While this disease is incurable, patients may live to be thirty or more years of age. Basal-cell cancer is the type usually reported, but other neoplastic growths have also been found. The treatment is palliative. All keratoses and ulcerations should be destroyed as early as possible, preferably by some form of high-frequency current such as electrocoagulation.

## INFLAMMATORY DERMATOSES

Most observers are in accord with Hazen, who says: "Eczema, lichen planus, and psoriasis occasionally give



rise to cancer of the skin, but in the vast majority of the cases reported it is probable that either arsenic or roentgen ray was the true cause."

### PAGET'S DISEASE OF THE NIPPLE (*A Manifestation of Intraduct Cancer*)

I shall report here three cases of Paget's disease of the nipple in which each affected breast presented a true intraduct carcinoma, as shown on microscopic study of serial sections. There were no palpable tumors in these mammary glands. It is significant that the lesion on the nipple of one of these carcinomatous breasts was of only one month's duration.

The observations in these cases substantiate the reports of Cheatele, Pautrier, Fraser and others who gave cogent reasons for removing Paget's disease of the nipple from the realm of the "so-called precancerous dermatoses" and putting it in the class of a true cancer.

Paget's disease of the nipple is most frequently seen in women over 40 and is usually unilateral. Most often it begins as a mild eczematoid condition of the nipple which may spread over the areola and even part of the breast. Later it may become ulcerated or erosive. In the more advanced stage there may be retraction of the nipple. Occasionally before any dermic lesion is seen a serous exudation may be present on the nipple as a forerunner of what is to follow.

### THREE CASE REPORTS

CASE 1—Mrs. R. C., a patient of Dr. Edward P. Swift, aged 45 and the mother of two children, was first examined by me Jan. 14, 1929, when she complained of a slight irritation of the right nipple of one month's duration and said that the nipple had looked perfectly normal before the symptoms began.

On examination of the right breast, an eczematous con-

dition involving the entire right nipple was found. The surface of the involved nipple was eroded and appeared flatter than the normal one. The affected nipple was slightly more firm but was freely movable. The areola appeared to be normal. No tumor masses were present in the breast or axilla on palpation. A section from one corner of the nipple, taken for microscopic study, revealed the typical changes of Paget's disease. This microscopic diagnosis was concurred in by Drs. Ewing, Fraser and Satenstein.

Two weeks later the entire breast was removed. A microscopic study of numerous serial sections of part of the tissue and ducts revealed a glandular carcinoma in one of the ducts about 2 mm. from the surface.

Through and through vertical serial sections of the breast were also made according to Cheate's method. These sections did not reveal any deeper intraduct carcinoma.

CASE 2—Mrs. R. D., aged 61, first came to the Skin Clinic of the New York Post-Graduate Medical School and Hospital, May 22, 1929, at which time she complained of an abnormal involvement of the right nipple of two years' duration.

On examination the right nipple and surrounding areola were found covered with a well defined, somewhat irregular, slightly thickened erythematous plaque. The right nipple was smaller than the left and was slightly infiltrated. There were no masses palpable in the breast and no axillary gland enlargement.

A microscopic study of sections by Drs. Satenstein and Fraser showed typical Paget's disease with an intraduct carcinoma.

CASE 3—Mrs. S., aged 60, a patient of Dr. Oleynick, presented an eczematous and retracted condition of the left nipple and areola of two years' duration. There were no palpable tumors or enlarged glands. A microscopic

study of a biopsy of the nipple and deeper tissue by Dr. James Ewing revealed a typical Paget's disease with an intraduct cancer.

Dr. James Ewing, who carried out the microscopic studies of the breast in cases 1 and 3 made the following statement in a personal communication:

"It is now pretty well agreed that Paget's disease of the nipple is so uniformly associated with carcinoma of the ducts of the breast that treatment must be designed to deal with a duct cancer. These small duct cancers may be found in any part of the breast and they are sometimes multiple. A palpable tumor may not be felt."

I agree with those who believe that Paget's disease of the nipple is a true cancer from the beginning; that, as indicated above, the Paget cells found in the epidermis are true cancer cells. I am also inclined to believe with Masson and Pautrier that Paget's disease of the nipple is an epithelioma that has arisen in the first milk ducts near their mouths. Finally, I too am strongly of the opinion that Paget's disease should never be considered a precancerous lesion but always a carcinoma of the nipple, symptomatic of a deeper carcinoma of the breast, and that early and total removal of the mammary gland is always indicated.

#### EXTRA-MAMMARY PAGET'S DISEASE

While Paget's disease has been described in regions other than the nipple by numerous observers (Pautrier mentioned 28), none of them have proved by histological examination that this disease was present without a carcinoma involving the deeper structures such as sweat glands, pilosebaceous apparatus or other subjacent glands.

Of 22 reports of extra-mammary Paget's disease, Pautrier found that 13 were either true basal-cell epitheliomas or were associated with subjacent glandular carcinoma. Several were diagnosed on clinical grounds only. Therefore these latter reports are valueless. The remaining

few cases showed no "Paget cells" microscopically, and the histological reports otherwise did not conform with those of Paget's disease. If this condition does exist it is doubtful whether it is present without a carcinoma of the subjacent tissues.

### BASAL-CELL EPITHELIOMA

A large number of chronic lesions of the skin in individuals past 40 years of age are found to be basal-cell epitheliomas. They frequently develop on seborrheic keratoses. Basal-cell epitheliomas may differ greatly in their clinical appearance. They may occur at any site over the body. They may be superficial or deep, nodular or ulcerating. It is interesting to note, however, that about 80 per cent of these lesions occur about the head and neck. The method of treatment to be chosen depends upon the character of the lesion and its location. The large majority of basal-cell epitheliomas can be cured especially when treated early. However, lesions which have been present for a long time and which have invaded bone and cartilage may prove much more resistant to radiation and require more intensive treatment.

MacKee reported a large number of basal-cell epitheliomas treated entirely by roentgen rays. His results were equal to those obtained by other methods of treatment. In over 400 cases he had 87 per cent permanent cures in unselected cases and 91 per cent permanent cures in selected cases. Hazen reported his results of 200 cases treated entirely with roentgen rays, with permanent cures of 86 per cent in unselected cases and 93 per cent in selected cases after observation of one to eight years. Most of the failures reported in both MacKee's and Hazen's series were in lesions of long duration with involvement of bone or cartilage.

Equally good results have been obtained by radium especially in the last five years. Quick reported 800 cases of basal cell epitheliomas of the face, 95 per cent of which have had complete regression. Quigley treated 140 cases

of the face with 15 failures. Morrow and Taussig treated 322 cases with 113 cures under one year, 186 over one year, 13 still under treatment and 10 failures.

My results with irradiation have been similar to the above and the results with roentgen rays or radium were practically of equal value. However, radium was successful in a few cases where roentgen rays had failed. At times radium can be more easily utilized than roentgen rays, especially in such areas as the inner canthus of eye and the alæ of the nose. On the other hand roentgen rays are more widely available and distinctly less expensive.

I have used the unfiltered roentgen rays frequently for basal-cell epitheliomas. The following were standard factors: three milliamperes, one hundred kilovolts (6 in. sp. g.), eight inch distance from target to skin, time five or six minutes, i. e.,  $2\frac{1}{2}$  or 3 skin units. This exposure may be repeated two weeks after all reaction has subsided (6-8 weeks); or a dose of lesser intensity given according to the progress or size of the lesion. Usually two such treatments were sufficient for a cure. The larger lesions were routinely destroyed by electrocoagulation before roentgen ray therapy. My experience has been that preliminary destruction by electrothermic methods increased the number of cures and decreased the amount of radiation necessary. One-eighth to one-quarter of an inch of normal skin about the lesion was included. This is an important factor in preventing recurrences.

Lesions involving the cartilage of the ear or nose are completely destroyed by electrocoagulation or excised with the high-frequency knife; followed by two skin units of unfiltered roentgen rays or the equivalent dosage of radium element or radon applied to the site of the lesion. In this manner severe radium or roentgen-ray reaction is avoided in the cartilage, and healing is much more rapid. Skin lesions involving the bone require removal of the diseased bony tissue.

Lesions of the eyelids not involving the conjunctiva in selected cases may be treated successfully with roentgen

rays or radium. If the eyeball is in the line of the rays the eye must be protected with a brass eye shield inserted beneath the lids. Supersoft roentgen rays (Grenz Rays 2 AU) have been used with success in epitheliomas of the upper eyelid but they have failed in lesions of the lower eyelids.

Radium element or radon used in the form of plaques or packs for surface applications accomplish the same results as roentgen rays in the treatment of basal-cell epitheliomas. The average lesion of this type may be cured with radium or radon. The following treatment is given: a full strength plaque filtered with two millimeters of aluminum and one layer of rubber dam giving a dosage of 40 to 60 milligram hours per sq. cm. for the small lesions and 40 to 50 milligram hours per sq. cm. for the larger lesions (larger than two square cm.). For the more deeply infiltrated lesions a filter of 2 mm. of brass is used giving a dosage of 60 to 80 mgm. hours per sq. cm. Two to four millimeters of normal skin about the lesions are included. The surrounding skin should be protected with lead plates having windows the size of the area to be treated. The plaque with the filters is then applied directly to the lesion and secured in place by adhesive. Double faced adhesive is of value in maintaining good approximation. Often one such treatment is sufficient for a complete regression of a basal-cell epithelioma. When the regression is not complete the treatment may be repeated two weeks after all reaction has subsided. Other methods of applying radium may accomplish equally good results in experienced hands.

### PRICKLE-CELL EPITHELIOMAS

Prickle-cell epitheliomas present a more difficult problem than the basal-cell type. They grow more rapidly, may metastasize early, and usually are more resistant to radiotherapy. A complete destruction of every cancer cell is important and must be accomplished early and rapidly. This type of cancer may occur at any site. They

often develop on such lesions as senile, arsenical, and tar keratoses, smokers' patches, and other types of leukoplakia. They are frequently seen on the lip, tongue, buccal mucosa and floor of mouth. I have observed that the majority of epitheliomas of the extremities are of the prickle-cell type, especially those on the dorsum of the hands. Recently I reported a number of prickle-cell epitheliomas, which had developed in senile keratoses.

The treatment of prickle-cell epitheliomas varies depending on the location and the character of the lesion. A microscopic study is necessary in each case, for proper therapy cannot be given without knowing the type of lesion, degree of malignancy and its probable radiosensitivity. The information often to be gained by histologic study warrants the danger of making a biopsy of a neoplasm. Ewing warns against indiscriminate biopsies but says, "the removal of a small carefully selected portion of a readily accessible tumor seldom results in any harm." I believe that the dangers of a biopsy are overestimated.

This discussion of treatment is limited to localized lesions without apparent glandular involvement. The dermatologist is usually not equipped to treat those cases that present involvement of the glands. The latter are better handled by a surgeon experienced in malignancy and in collaboration with a radiotherapist.

Early prickle-cell epitheliomas of the trunk or extremities can be treated successfully by radiation alone. Most often, however, it is desirable first to remove the lesion surgically or to destroy it by electrocoagulation. Following this radium or radon should be applied. When radium is used intensive gamma ray radiation should be employed. Even though there be no apparent involvement of the adjacent glands a series of prophylactic exposures of roentgen rays filtered through three millimeters of aluminum should be given, i. e., erythema doses at intervals of two months for three treatments.

In the treatment of prickle-cell epitheliomas with radium, the required doses were given over a period of 4

to 8 days, giving equal time each day during this period after the method of Regaud. Continuous treatment with large doses over a period of several days gave satisfactory results.

When it was found preferable to implant radon seeds into the tumor, gold seeds were used as they could be left in the tissues permanently, each millicurie thereby giving 133 millicurie hours of treatment.

The lesions over cartilagenous areas, particularly the ears, are very resistant to irradiation. These lesions should first be thoroughly destroyed by electrocoagulation and then followed by irradiation. Much better results have been obtained in these cases since adopting this method of destruction, especially when the cartilage was involved.

Lesions in the inner canthus of the eye which are usually of the infiltrating type respond well to radium treatment when the growth is first destroyed by electrocoagulation.

*Lip lesions* are much more serious than those of the glabrous skin. They grow more rapidly and may metastasize early. They may be papillary, ulcerating or infiltrating. The infiltrating type is the most dangerous for it metastasizes more quickly. The papillary type responds more rapidly to radiotherapy. Early superficial localized lesions of the lip can readily be cured with surface applications of either radium plaques or tubes. However, I believe it best to destroy these lesions first with electrothermic methods and then to apply full strength radium plaques to the involved area; and to give 80 to 100 mgm. hours per sq. cm. through a filter of 2 mm. aluminum. When these tubes are used with a filter of 0.5 mm. of silver 80 to 100 mc. or mgm. hrs. are given to each sq. cm. The area to be treated should always include about 5 mm. of tissue beyond the lesion. The tissue outside the area to be treated should be protected by proper screening. Prophylactic exposures of roentgen rays should always be



given to the lymphatics which drain the lip area even though there be no evidence of involvement.

Lip lesions which are more deeply infiltrated require more intensive therapy. In addition to the above surface applications, gold radon seeds may be permanently buried in the lesion using one seed for every cubic centimeter of tissue treated. These seeds may be 1 to 1.5 millicuries each, depending upon the reaction desired. I have never seen any deleterious effects as a result of the permanent implants acting as foreign bodies. This combined surface and interstitial method of applying radium will usually produce complete regression of the lesion.

The highest percentage of good results have been obtained by first excising the lip epithelioma widely with the high-frequency knife, following which the site of the lesion was treated by an erythema dose of gamma rays of radium by surface applications or by the implantation of gold seeds as described above. In a few early cases excision alone with the high-frequency knife was sufficient to cure. The patient should have the additional safety factor to be derived from radiotherapy in all of these cases. When surface applications only are employed, the dose can be considerably increased by cross-firing through three portals of entry, i. e., applying an applicator over lesion, on the mucosa, and on the skin externally. As was mentioned before prophylactic doses of roentgen rays were always given to the lymphatics draining the involved area.

Regaud utilizes wax molds for surface applications. Platinum tubes of 0.5 mm. wall thickness and containing 5 to 10 mgm. of radium are approximated to the external surface of the mold at one centimeter distance. The radiation is given over a period of 5 to 8 days. His results in lip cases have been good. He reported cures of 98 per cent of operable cases without glands, and 92 per cent of operable cases with glands. In cases of doubtful operability including those with glands he had 72 per cent cures.

Quick uses heavily filtered radium or radon at a distance

of one cm., or gold filtered radon seeds interstitially. His results equal those of Regaud.

*Lesions of the tongue, floor of the mouth and buccal mucosa* differ widely in regard to malignancy and radio-sensitivity. Metastases occur increasingly according to the location as follows: anterior tongue; posterior tongue; infralingual; and floor of the mouth. Metastases are greater from the tongue and floor of the mouth than from the lip and the glands involved are deeper. For the mouth lesions, the interstitial method of irradiation with or without electrothermic methods as indicated has given the most satisfactory results. Tongue lesions may be treated by interstitial irradiation with gold radon seeds implanted permanently into the tumor area and across the base of the tongue (to block the draining lymphatics). Prophylactic roentgen therapy should be given to the draining lymphatics of the cervical region. I usually use 1 or 2 mc. gold seeds and place one seed to each cubic cm. in and around the tumor area and four to six such seeds in the base of the tongue. The reaction may be severe but necrosis as a rule does not occur. Quick uses gold seeds interstitially and the radium pack (4 gm.) for external irradiation giving as much as 10,000 to 12,000 mc. hrs. to each side of the neck at 6 cm. or 10 cm. distance and in addition high voltage roentgen rays. He believes that the tissue will tolerate a larger dose of external irradiation when both radium and roentgen rays are used and that radium has the greatest effect on cellular areas and roentgen rays the greatest effect on fibrous areas. By this combined method of interstitial and external irradiation he gives from 2 to 10 skin erythema doses to the tumor area in 4 to 8 days according to the degree of malignancy and radioresistance of the tumor.

For tongue lesions Regaud uses platinum needles of varying length with a wall of 0.4 mm. thickness. These needles contain radium or radon and are inserted into the tumor area and surrounding tissue. For the base of the tongue and lymphatics external irradiation is given by

means of molds and packs of radium at a distance. This treatment extends over a period of 5 to 8 days.

*Epithelioma of the penis* which is usually of the prickle-cell type responds well to roentgen rays and radium in early cases. One to three per cent of all cancer in the male is found on the penis. Two types are seen: the papillary and the flat infiltrating. They usually begin as a small indurated area and soon present a small central ulceration. If treatment is begun before the deep tissue is invaded an early cure is to be expected. When the growth has spread past Buck's fascia the lesions do not respond as well to radiation and a certain number require amputation of the organ. This is best accomplished by electrothermic methods. For small lesions of recent development I have used full strength plaques of radium with a filter of 2 mm. aluminum giving 80 to 100 mgm. hrs. per sq. cm. Prophylactic roentgen rays are given to the inguinal glands. Pfahler and Widmann reported 10 cases of cancer of the penis treated by radiotherapy and electrocoagulation, with 9 cured from five to twelve years. They believe that irradiation of the glands gives superior results to resection. Dean reported 75 cases of epithelioma of the penis. None of his cases occurred in individuals who were circumcised in infancy. He believes the tight prepuce to be the most important factor. He uses radium for the primary lesions and roentgen rays for the glands in the groin. The primary lesions receive 1,200 mc. hrs. per sq. cm. at one cm. distance with the radium in silver tubes of 0.5 mm. walls. Dean uses a radium pack (4 gm.) for groin metastases giving 9,000 mc. hrs. at 6 cm. distance with 0.5 mm. silver and 1 mm. brass. This is followed in three to four weeks by block dissection. He reported good results with radium alone in lesions less than two centimeters in size and those larger he found required combined surgical measures and irradiation. In most of his cases radical amputation was not necessary.

*Epithelioma of the vulva* is not common and usually occurs in those past fifty years of age. When treated

early, the prognosis is favorable. When operable, these lesions should be removed by wide excision, with the high-frequency knife and radon seeds implanted throughout the area. Deep roentgen rays are given to the groins. Rentschler reported 71 cases which were treated by excision of the primary mass and resection of the glands of the groin. Radium and roentgen rays were given to the site of the primary lesion and to the groins. Forty-four died, 17 are living and 13 are free of the disease. As a measure of prophylaxis all cases of kraurosis vulvae should be treated by radical excision. This gives prompt relief from all symptoms and prevents the development of epitheliomas. Roentgen rays and radium fail to influence the course or symptoms of kraurosis vulvae and are contra-indicated.

#### BASAL-SQUAMOUS CELL EPITHELIOMA

"Basal-squamous cell epithelioma" is a term used to describe the transitional form that occurs between the basal-cell and the squamous-cell epithelioma. I have been able to study one case that fits into this group. The following conclusions drawn by Montgomery from his studies of fifteen cases which he defined as basal-squamous cell epithelioma are as follows:

"In a series of basal-cell epitheliomas diagnosed clinically as such, from 15 to 20 per cent on microscopic examination will probably prove to be transitional in character."

"Basal-squamous cell epithelioma, in the majority of cases, is relatively resistant to roentgen-ray and radium treatments as compared with basal-cell epithelioma. Radiotherapy should be used only as a last resort in the treatment in these cases."

"Surgical treatment, with an unusually wide excision because of the insidious infiltration of the tumor cells, is indicated whenever possible."

There is no doubt that all of us have encountered what appeared to be typical basal-cell epitheliomas which were

most resistant to intensive doses of roentgen rays and radium. Perhaps some of these resistant lesions belonged to the type described by Montgomery who stated that this transitional form occurs frequently and on account of its tendency to metastasize, the prognosis is serious as compared with basal-cell epithelioma.

### TRANSITIONAL-CELL EPIDERMOID CARCINOMA

The predominant clinical features of transitional-cell epidermoid carcinoma are: usually a small primary lesion of the base of the tongue or tonsil; early metastases with wide dissemination; and rapid response to irradiation.

Ewing, Quick, and Cutler who studied a large number of intra-oral epidermoid carcinomas found that a certain percentage responded more rapidly and more completely to irradiation than the others. These tumors were found to possess other characteristics, i. e., usually a small primary lesion, early metastases and pathological characteristics which differed from other epidermoid carcinomas. Quick and Cutler termed these growths "transitional-cell epidermoid carcinoma."

The most common sites of these lesions are the tonsil, base of tongue and nares. The appearance of the primary lesion is more or less characteristic and differs from that of a primary squamous-cell lesion. The transitional-cell lesion is flat and presents a finely granular, velvety surface which looks like an erosion of the mucous membrane rather than an ulceration. Squamous carcinoma usually presents an elevated indurated lesion with a depressed ulcerated center and has a coarsely granular appearance. The primary transitional-cell lesion is frequently small or indistinguishable and often the first sign of disease is a swelling in the neck. Many cases have been erroneously diagnosed as bronchiogenic carcinoma, endothelioma, or lymphosarcoma. The transitional-cell neoplasm must always be considered before making a diagnosis of primary disease of the cervical lymph nodes.

Transitional-cell carcinoma is a highly cellular malign-

nant tumor. The cells are small, uniform in size, with large hyperchromatic nuclei and scanty cytoplasm growing diffusely. Adult squamous characteristics such as cornification, spines, and pearl formation are absent.

The marked radiosensitivity which leads to the discovery of these tumors is the important factor in their treatment. They should be treated by radiotherapy because of their high radiosensitivity and high grade of malignancy and must be treated early. The primary lesion may be treated by gold radon implants distributed uniformly throughout the tumor. This treatment has been very satisfactory and most of the tumors have regressed rapidly and without necrosis. The treatment of the metastatic lymph nodes with high voltage roentgen rays and radium has resulted in a complete regression in most cases. Quick reported cures of some cases treated entirely with external irradiation by combining high voltage roentgen rays and the radium pack (4 gm.). By this method one of his cases received between two and one-half and three erythema doses to the glands and primary lesion by external irradiation and has been without evidence of disease for over three years.

### PRIMARY SARCOMA OF THE SKIN

Sarcomas are the least common of the cutaneous malignant neoplasms and for this reason very little definite information is obtainable. They vary considerably as to the clinical type, histologic structure, degree of malignancy, and likewise in their response to radiotherapy. They may be either single or multiple. The large majority of primary sarcomas of the skin are of the spindle-cell or fibrous type. The fibrosarcoma is the most benign. They respond poorly to radiotherapy and complete surgical excision offers the best prognosis.

The spindle-cell type may be composed of large or small cells and varies as to the amount of cellular elements. The spindle-cell sarcoma may be radiosensitive when highly cellular and radioresistant when composed almost

entirely of stroma. Therefore, the cellular type should be treated with roentgen rays or radium and the fibrous types by surgical excision with irradiation before and after removal. Recurrences frequently occur and pulmonary metastases are the end results in many cases.

The giant-cell sarcomas (usually develop from the tendon sheaths) are least malignant and very radiosensitive, roentgen rays and radium being almost specific in these lesions.

Under the name of neurogenic sarcoma Ewing has classified a group of tumors commonly designated as fibrosarcomas, spindle-cell sarcoma and fascial sarcoma. These lesions usually arise about the arms, legs, popliteal spaces, abdominal and chest wall as small movable subcutaneous nodules. Quick and Cutler reported 75 cases of neurogenic sarcoma most of which had from one to three recurrences after local removal. Operable cases were given irradiation and widely excised with only a few cures. In 10 cases, amputation of the extremity resulted in 5 cures and 5 deaths from pulmonary metastases. Only 17 had a complete regression in their series of 75 cases.

Dermatofibrosarcoma was described by Darier in 1924 and several cases have been reported since. These tumors are usually of the acellular spindle-cell variety, are relatively slow growing and do not metastasize. They are radioresistant and have a marked tendency to recur when excised. The most successful results have been obtained when they have been very widely excised. Senear reported two cases treated by surgical excision without recurrence.

Melanosarcomas are exceedingly rare lesions and arise from pigmented lesions in the cutis (Bloch blue nævus). Their treatment is identical with that given for melanocarcinoma.

Lymphosarcomas usually arise in a single chain of lymph glands but may arise from lymphatic tissues elsewhere. They are exceedingly malignant. Their response

to radiotherapy is very rapid. Recurrences are frequent. Often metastases although not apparent have occurred before therapy was instituted. One of my cases of lymphosarcoma treated two and one-half years ago has had no recurrence. This patient was a man 60 years of age who had a lemon-sized stony hard mass of twelve years' duration on his chin. There was a nut-sized firm gland on the left side of his neck near the chin. The above microscopic diagnosis was concurred in by Doctors Ewing, Satenstein and Fraser. The lesion and gland were removed by the high-frequency knife, following which the base was electrocoagulated. The next day high voltage roentgen rays in erythema doses were given to the neck lymphatics and site of the lesion. This was repeated twice at intervals of two months.

The preferable therapy for lymphosarcomas is by irradiation alone, but due to the unusual hardness of this mass, combined surgery and radiotherapy was indicated in this case.

The best results in early sarcomas are obtained by a combination of radiotherapy and surgery. The dose required with either roentgen rays or radium is the same as that given for prickle-cell epitheliomas. Following the initial radiotherapy, if there is considerable regression indicating radiosensitivity, they may be treated entirely by this method but the more radioresistant lesions will require surgical excision and postoperative radiotherapy.

### SUMMARY

1. It has been shown that over twenty different skin conditions may be precursors of cancer.
2. The incidence of cancer supervention in such dermatoses has been discussed.
3. The early recognition by the general practitioner and the judicious treatment of those dermatoses which may lead to cancer would aid in lowering the mortality rate in this disease.



4. The treatment of the various types of cutaneous malignant neoplasms has been outlined.

5. Those conditions which had a high degree of sensitivity to irradiation and which could be satisfactorily treated with irradiation alone were noted.

6. The lesions which should be treated by some surgical method combined with irradiation have been discussed.

7. The information often to be gained by histologic study warrants the danger of making a biopsy of a neoplasm. In this way the degree of malignancy and its probable radiosensitivity may be determined. The removal of a small carefully selected portion of an accessible tumor seldom results in any harm.

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## MORE COMMON DISEASES OF THE TEETH AND JAWS

THEONOR BLEM, M.D., D.D.S.

*Delivered February 27, 1931, in the Friday Afternoon Lecture Series of The New York Academy of Medicine.*

The general medical practitioners as well as the medical specialists are probably less familiar with conditions of the jaws and teeth than with those of any other part of the body, for which reason a discussion of the more common diseases involving these structures is rather timely. Because a detailed study would involve a good deal of time, an attempt will be made to mention only the most important conditions and discuss them briefly.

In former years, a goodly percentage of the medical and dental profession believed that almost any ailment could be cured or at least improved by the removal of infected teeth. At the present time the problem of oral focal infection is more conservatively treated and, therefore, a more sane mode of procedure indicated where an oral focus is suspected. First of all there must always be co-operation between the medical practitioner and the dentist or oral surgeon. The teeth and jaws will have to be completely x-rayed, pulptested and transilluminated and all teeth and roots not amenable to dental treatment removed if there is no objection on account of the patient's general condition. So much should be done for every patient. If, however, not only an oral focus is suspected, but if the patient is also suffering from a disease which is known to be caused by a focus or improved by the removal of the same, then as a last resort, all devitalized teeth otherwise in good condition from the dental standpoint as well as teeth showing gingival disturbances which cannot be cured, will have to be sacrificed. Even in those cases where a doubt exists as to the connection be-

tween an oral focus and the patient's ailment, one cannot take the chance to leave such teeth in position, and this radical procedure will have to be adhered to.

Pathological changes at the apical end of a tooth in the form of a thickened apical peridental membrane (so-called granuloma) and cysts in the same region do not always indicate that such teeth must be removed. In a large number of cases such teeth remain useful for many years after the dentist has properly treated and filled the root canals and the apices as well as the granuloma or cyst have been surgically removed (Root Amputation). Such procedure is generally indicated in cases where no suspicion of focal infection is present, although cures of focal disease have been reported with this conservative method. Curettage of the apical area after extraction is always indicated because it is well known that such granulomas may develop into cysts if epithelial rests are present in the peridental membrane and because the extraction of such a tooth alone would not prevent cyst formation.

Cysts developing from devitalized teeth as well as the follicular cyst forming around the crown portion of malposed teeth are quite frequently seen in the jaws and will, if they are permitted to grow, destroy not only the surrounding bone, but also the usefulness of adjoining teeth. In the maxilla they will at times displace the antrum, although they never communicate with the antrum unless an acute infection within the cyst finds its way through a thin—at times only membranous wall—into the maxillary sinus. As a rule, diseases of the maxillary sinus belong to the field of the rhinologist. Only in those cases where the antrum is involved through some disease of the teeth or the surrounding bone it becomes the duty of the oral surgeon to treat the antrum.

Malposed teeth present a problem about which the medical practitioner should be better informed. Although such teeth do not become infected while they are unerupted, the possibility of their causing nervous disturb-

ances must be kept in mind. For that reason such teeth should be either placed into normal position—for which purpose the orthodontist and oral surgeon will have to co-operate with the general dental practitioner—or they should be removed. The operation for their removal should be advised in the young because at this time the roots of these malposed teeth are not fully formed and the bone will not be found as hard and dense as in adult life. Infections from partly erupted teeth whether malposed or not may become very serious if not treated conservatively, as illustrated in my practice by the case of a young man who died of cavernous sinus thrombosis which had followed an attempt to remove a partly erupted malposed mandibular third molar during an acute infection of the surrounding soft tissues.

Infections of the bone are quite common in the mandible and maxilla on account of the frequency of dental caries. Conservative treatment of osteomyelitis is even more indicated in the jaws, as a loss of bone and deformities here cannot be taken care of as readily as in other parts of the body. Watchful waiting, evacuation of pus whenever or wherever it collects and removal of sequestra when fully developed will give the best results. A word of warning against curettage is essential because curettage is absolutely contra-indicated in osteomyelitis, acute or chronic, and is always the cause of extensive destruction of bone.

Of the diseases of the salivary glands, the formation of calculi is most frequent, although the calculus may be present for many years without symptoms. The sudden obstruction to the normal flow of saliva will cause excruciating pains and a marked swelling of the involved gland which only slowly subsides; such swellings will have a distinct outline corresponding to the position and form of the salivary gland. The vast majority of salivary calculi can be removed intraorally and without removal of the gland. The diagnosis can be confirmed and the operative procedure outlined by a proper x-ray examination.

The oral cavity is a very fertile field for the study of

tumors, not only microscopically, but especially from the clinical standpoint. Often tumefactions of the free gingiva are found, which microscopically show only chronic inflammation. Another group of tumor forms are the epulides which are somewhat on the borderline between true neoplasms and inflammatory conditions because they also show inflammation. As the name implies they are found upon the gum tissue or the ridge. Their successful removal necessitates the sacrifice of some of the surrounding healthy tissue including teeth, the amount of which can be determined by the experienced reader of the roentgenogram of the region. Related to this class of growths is the pregnancy tumor—termed angiogranuloma by Furedi, who made a valuable pathological study of the same—a tumor springing from the soft tissues of the mouth mainly the gingiva. Their surgical removal is indicated in all cases—although they disappear at times after pregnancy—to avoid their reappearance in later pregnancies and the loosening or loss of adjoining teeth. A study of the x-rays for the establishment of the correct diagnosis and outline of treatment is important. Of the true neoplasms there are found in the mouth most frequently the fibroma and osteofibroma, whose treatment coincides with that of the epulides. The care of a malignant tumor, like sarcoma and carcinoma, if circumscribed does not always require extensive resection, but complete removal which must include a safe margin of sound tissue and must be followed by radiation. Soon they will be more frequently detected in their very early stages, because education of the laity but particularly of the healing professions will be followed by early recognition and early treatment. The giant-cell tumor and osteitis fibrosa are proliferative masses rather than real neoplasms and will at times also have to be radiated. A great variety of tumors are found in the soft tissues of the hard and soft palate, all belonging to the group of mixed salivary tumors of benign and malignant variety, including adenocarcinoma and different gradations of basal-cell carcinoma. Local removal may not be sufficient and the study of many sec-

tions will determine the necessity for radiation. The most interesting tumors of the oral cavity are the ones originating from dental structures. The dental organ gives rise to simple, total and partial, and composite odontomas and cementomas; they are always benign. From the epithelium of the enamel organ originates the adamantinoma of the solid and cystic type. A preoperative biopsy may not be conclusive. A complete removal as of a malignant tumor is imperative, followed by a most thorough study of many sections, which so often reveal an atypical make-up or even a true carcinoma. Such cases naturally require radiation. It is best, however, to subject them all to this treatment. The subject of tumors cannot be dismissed without adding that the safest treatment for advanced (not circumscribed) malignant cases is in the hands of those surgeons and institutions who combine radium and x-ray treatment with their surgery.

In former years, trigeminal neuralgia was grouped amongst those conditions, the treatment of which was to say the least, ineffective. Since the perfection of the surgical operation for the relief of this complaint, namely, sub-total section of the sensory root of the fifth nerve by Frazier and Spiller, this malady can be entirely relieved. In the last 401 consecutive operations by Dr. Frazier the mortality has been two tenths of one per cent. Frazier says: "There is nothing obscure about trigeminal neuralgia save its origin." At times it may be difficult to differentiate trifacial neuralgia from atypical forms which are better termed facial pains. However, if one remembers that it attacks mostly patients past middle age and keeps in mind the unbearable typical paroxysmal pains, it seems that it can be differentiated from facial pains which are really entirely different, because not so severe, lasting for hours and relieved for a time by removal of teeth and different treatments, but always return. Although true major trifacial neuralgia is never relieved by peripheral operations or treatment of peripheral lesions, the patient should always be subjected to a thorough examination of the mouth, jaws and teeth and the mouth always put in

good condition, as it must also be done for those patients who suffer with facial pains, a relief for which is very rarely accomplished. Alcoholic injections are useful for diagnostic purposes and may be used as a method of treatment if the patient fully realizes that the injections are of only transitory effect. The neurologist and neurosurgeon should always be consulted in these cases, besides the family physician.

In conclusion I wish to say that the principle of periodic health examinations holds good for the mouth as well as any other part of the body. In fact, the dentists have appreciated this for more than fifteen years and have created the dental hygienist whose duty it is to subject a patient's teeth to prophylactic treatment and call the dentist's attention to the presence of any pathological condition. I go still further and believe that once a complete record of a patient's mouth has been taken by means of x-ray, pulp-test and transillumination—aside from the usual clinical records—the so-called bitewing x-ray examination which only shows the crowns and the neck of the teeth should be taken annually and only those teeth completely x-rayed which are devitalized. This x-ray examination in combination with the periodic treatment by the dental hygienist well trained in the recognition of the pathological conditions about the mouth will prevent many conditions, a successful treatment of which at the present time is either difficult or impossible.

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## DEATHS OF FELLOWS OF THE ACADEMY

CARLOSS JAMES CHAMBERLIN, M.D., 114 East 54 Street, New York City; graduated in medicine from Vanderbilt University, Nashville, Tennessee, in 1922; elected a Fellow of the Academy January 3, 1929; died, July 16, 1931. Dr. Chamberlin was a Fellow of the American Medical Association, a Fellow of the American College of Surgeons, a member of the County and State Medical Societies, and Assistant Surgeon to Metropolitan and Skin and Cancer Hospitals.

HERMAN FERDINAND LAMPE, M.D., 34 East 51 Street, New York City; graduated in medicine from the Jefferson Medical College of Philadelphia, in 1915; elected a Fellow of the Academy November 1, 1923; died, July 20, 1931. Dr. Lampe was a Fellow of the American Medical Association, a member of the County and State Medical Societies, a member of the American Laryngological, Rhinological and Otological Societies, a member of Kings County Hospital Alumni Club, a member of the Alumni Association of New York Eye and Ear Infirmary, Aural Surgeon to the Midtown Hospital, Senior Assistant Aural Surgeon to the New York Eye and Ear Infirmary, and Otologist to the Broad Street Hospital.

JOHN OSBORN POLAK, M.D., 20 Livingston Street, Brooklyn, N. Y.; graduated in medicine from Long Island College Hospital, in 1891 and from the Medical Department of the University of Vermont, in 1891; elected a Fellow of the Academy June 6, 1895; died, June 29, 1931. At the time of his death, Dr. Polak was one of the Vice-Presidents of The New York Academy of Medicine. He was Professor of Obstetrics and Gynecology at the Long Island College Hospital Medical College, a Fellow of the American Medical Association and a member of many other medical societies. He was Instructor and Professor at New York Post-Graduate Medical School from 1894 to 1907. In 1903 he was Professor of Obstetrics and Clinical Professor of Gynecology at Dartmouth Medical School. Dr. Polak was the author of "Manual of Obstetrics" and "Manual of Gynecology" and of many papers and medical periodicals.

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## EDITORIAL

### RUSSIAN MEDICINE UNDER THE OLD REGIME.<sup>1</sup>

There is a generalization of the French anthropologist, Lapouge, to the effect that the conqueror or settler in a strange region assimilates himself in the end to the conquered (native) people.<sup>2</sup> It will be found upon examination, that this theorem is not of universal validity and is, perhaps, not even true in all its parts. In other words, it may be true in certain latitudes and longitudes or periods of time but not in others, and is perhaps better understood in the light of Tredgold's dictum: "The environment of to-day is the heredity of tomorrow." The Normans in Sicily were mongrelized to the point of extinction. The English in Ireland became proverbially "more Irish than the Irish themselves"; but the Normans in Normandy remained Norsemen, the Celts in Brittany, Wales, Ireland, Cornwall and the Scotch Highlands remained Celts, albeit profoundly influenced by environment, just as German-Americans, Irish-Americans or Jewish-Americans are different, in many respects, from Germans born in Germany, Irishmen born in Ireland or Jews born in Europe, Asia Minor or North Africa. In the case of Russia, an area covering one-sixth of the land surface of the globe and comprising 150 millions of its people, the effect of environment seems indubitable and ineluctable. Russia in Europe is a vast plateau, surrounded by lofty mountains sloping to level

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<sup>1</sup>Lecture delivered at the Institute for History of Medicine, Welch Medical Library, Baltimore, Maryland on March 26, 1931.

<sup>2</sup>G. de Lapouge: *Rev. d'anthrop.*, Paris, 1887, XVI, 524.



plains, with little to diversify the monotony except a fringe of foothills and the valleys of mighty rivers, so well paired and parallel in their courses that communication by portage and canals is easy. The Russian rivers, so prominent in the Russian poetry and music, have come to be regarded as more efficient agencies of national unity and commerce than the institutions of the country or even its railways. A climate ranging from 86°-109° F. in summer to 13°-54° below zero in winter, singularly uniform, from the Arctic to the Black and Caspian Seas, yet with little rainfall; the isolation occasioned by relative lack of seaboard; the continuity of the selfsame plateau formation, called by the Germans "*die grosse Ebene*," from the Baltic and the Ural Mountains to the Pacific—all these monotones make for uniformity, standardization, centralization, the assimilation of the individual to the environment. Scythian and Sarmatian, Greek and Norseman, Finn, Hun and Bulgar, Tatar and Turk have all of them overrun the Russian plateau in their day, and like the big German immigrations in the 18th and 19th centuries, all have been assimilated to the Slavic type. The Russian winter, the passive resistance of the people, proved too much even for the great Napoleon, and Falkenhayn, fearful of the same *salto mortale* "in the air," rejected Ludendorff's plan of a clean sweep over the Russian lines of communication, remote from his basic commissariat. Catherine the Great, a Prussian princess, bred in the straight-laced code of the 18th century Lutheran, became more Russian in spirit, more Asiatic in morals, than the Orlovs or Potemkin or the daughter of Peter the Great. The same extraordinary power of assimilation is sensed in the political and social institutions: at one extreme, the *mir* or peasant village community, at the other a Byzantine bureaucracy so taut, so minute in its ramifications that there were said at one time to be more official dog-catchers in St. Petersburg than dogs. Such forcible Russianization as that of Finland was not the work of the people, but of bureaucrats and clerks. Evolution, from *volost* (canton) to *zemstvo* (provincial or district) government up to the *duma*, effected little of con-

sequence. The reforms of Alexander II (1864) were swept away inchmeal by reactionary legislation under Alexander III (1889-93) and Dorpat became Jurjev in 1893. The enchainment of the peasants to the soil (*adscriptio glebae*) merged into the iron-clad passport prohibitions put upon leaving the country, and this virtual imprisonment within its frontiers is even more rigorously enforced under the Soviet. The spirit of the *artel* or communal guild, like the wooden houses, the Russian baths, the samovar, the troïka, the mediæval costume of the *isvotschik* (cabman), the patriarchal communism, the autocratic bureaucracy, the espionage of *dvornik* (house porter) and secret police, the Asiatic morals of the upper ten, the skill in linguistics, the assimilative power, nearly all these things have persisted under the Soviet on a colossal scale. Apart from primitive folk medicine, Russian medicine up to the time of Pirogov, was in the hands of incoming foreigners. Its greatest developments were military and social: the Military Medical Academy and the immense network of community medicine and communal hygiene attaching to the *zemstvo* development of 1864. Patterned after the medicine of Western Europe and dependent upon it, the scientific medicine of Russia exerted no influence upon the rest of the world prior to the advent of Metchnikov and Pavlov. Pirogov, Metchnikov, Pavlov are its three greatest figures, men who would do honor to any country, typifying the immense latent ability in the Russian people and their absolute freedom from the pretentiousness which is vulgarity.

In 862, Russia emerges upon the stage of European affairs *ex abrupto*, with no apparent relation to the historic or prehistoric past. According to the monkish chronicle of Nestor of Kiev, certain Slavic and Finnish tribes in the forests around Lake Ilmen expelled the Norsemen to whom they had paid tribute (850), but falling out among themselves, sent a deputation to Rus (Sweden) twelve years later, to beckon them back with these words: "Our land is great and fertile but there is no order in it. Come and reign and rule over us." This message, sounding the

note of dependence upon Western Europe for ten centuries, brought in the dynasty of Rurik, whose subjects became Russians. Rurik chose as his headquarters Novgorod, on the Volkhov, destined to become a great commercial centre of the Hanseatic league. Within two centuries, the Norse overlords had established themselves at Kiev on the Dnieper, and by the two great waterways opened to them, invaded Byzantine dominions, married one of their princes to a Byzantine princess, were converted to Christianity and made themselves a great power by intermarriage with the royal families of France, Norway, Poland and Hungary. The Republic of Novgorod expanded from the Baltic to the Ural Mountains. Its government was virtually a republic, with the prince (*Kniaz*) as military leader, while political power was invested in a popular assembly with civilian officials. All this was interrupted by the invasion of the Tatar hordes of Ghengis Khan, who defeated the Russians at Kalka (1224) and held them under tribute for one hundred and fifty years. Meanwhile the principality of Moscow had developed as a military despotism and here Dmitri Donskoi combined with other Russian princes to throw off the Tatar yoke at the battle of Kulikovo (1380). Moscow now became the dominant power and in 1462, Ivan III having thrown off all Tatar influence, constituted himself the autocrat or czar. His grandson was Ivan the Terrible (1533-84) who destroyed his subjects and subject nobles with a sadism surpassing that of Tiberius Caesar. Ivan's son, a weakling, was supplanted by Boris Godunov (1598-1605) who was in turn, menaced and put out of business by the false Demetrius, an adventurer purporting to be the rightful heir to the throne, whom Boris probably had assassinated. Dissensions following the death of Boris led to the election of Michael Romanov (1613-45), whose dynasty persisted down to the death of Nicholas II (1918).

And what was happening to medicine during these eight centuries?<sup>3</sup> It began, as all primitive medicine does and

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<sup>3</sup>The first worthwhile source of the history of Russian medicine is W. M. von Richter: *Geschichte der Medicin in Russland*, 3 vols., 8°, Moscow, 1813-17, which is accurate and reliable as to facts, dates and documentation down

must, with the usual folk superstitions, folk and herbal remedies, which are monotonously and inevitably the same among all early peoples and which still exist among living primitive peoples, Russian or other. The folk remedies and herbals are preserved in some 186 existing manuscripts, which have been duly collated and analyzed. Manuscripts going back to the Kiev and Vlademir periods (11th century A. D.) are known to have existed, but were probably destroyed in the burning of Moscow (1812). Those from the Muscovite principality, dating back to the 16th century, are few in number. After these, there is silence in the records until the time of Tzar Alexei Mikhailovich (1645-76), son and successor of Michael Romanov, when they crop out again in plenty. The earliest known, a Bulgarian MS. called the *Siratoslav Isbornik* (circa 1073), is a collection of ethical and philosophic writings, in the midst of which are listed a brief array of foods and drinks, arranged according to the months of the year in which they are best taken. The next MS. deals with remedies employed by Count Stroganov at the court of Ivan the Terrible (1533-84). The Stroganovs, descendants of a rich merchant, were operators of vast mining interests in the Ural Mountains (Perm), and had assisted the Cossacks in the conquest of Siberia (1582). In this barbaric environment, they imported competent European physicians, under whose tutelage they studied medicine. The author of the Stroganov MS. became so proficient in the art of healing, that he was summoned to Ivan's court. The MS. is probably derived from an English medical book, translated by Dr. Kabaishev, an employe of the Stroganovs. The

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to the time of Catherine II. The substance of the narrative is Englished in *Brit. & For. Med. Chir. Rev.*, Lond., 1862, XXX, 285-305. A later history, in Russian text is the "Brief Outline" (*Kratkie otcherk*) of L. J. Skorochodoff (Leningrad, 1926), which goes into the Soviet period and is replete with portraits but sometimes deficient in dates. Biographical data are obtainable from the collections of A. A. Polovsov (16 vols. 1896-1912), S. A. Vengerov (6 vols. 1897-1904) and I. V. Vladislavrov (1919), from Ricker's Index (13. ed. 1905-12), the official Directory (*Spisok*) of Russian physicians and the Index Catalogue (1-3. series). Very handy sketches are those in the *Lancet*, Lond., 1897, II, 272-276; 343-374 and by F. Dörbeck: *Arch. f. Gesch. d. Med.*, Leipz., 1909, II, 404-418, translated in *Med. Life*, N. Y., 1923, XXX, 223-234.

next MS. of interest, is an herbal called the Benign Cooling Garden (i. e. Florilegium or Herbal) from Count Uvarov's collection, of date 1534 and printed in 1616. It is a translation of a German compilation, in which some 542 medical plants and 144 mineral remedies are described in alphabetical order, with their Latin, Greek, Arabic and Russian names. This MS. engendered a whole family of "Benign Cooling Herbals." The rest of these MS. herbals and drug-lists are grouped by cities or governments (Novgorod, Pskov, Tversk, Troitska), by names of owners, or reigns of monarchs. They are thus of the same type as the Anglo-Saxon herbals and the empirical MS. formularies investigated by Charles and Dorothea Singer. Most of the earlier Russian MS. were probably destroyed during the period of Tatar invasion and domination (1223-1370).<sup>4</sup> Prior to this event, there were evidences of Greek or Byzantine influences in the representations of bandaging on the Koul-Oba Vase (4th Century B. C.). After the conversion of the people to Christianity (989), the care of the sick, hitherto allocated, like everything else of importance, to the "Elders" of the social group, became, to some extent, a function of the monasteries. The "Elder," be it said in passing, was the tall patriarchal individual of the *Sacre du printemps* or of our own rural and small-town communities, a shade more important than Priam at the Scæan Gate, with the air, which whiskers somehow connote, of being a great emporium of intellect, not unwilling to benefit the entire human race with the net result of his cumulative wisdom and experience. Richter, the medical historian of early Russia, has been ridiculed on all sides for his assertion that the primitive Russians were of such robust physique, so long-lived and blessed with such a healthy climate that they did not need physicians. He is correct, however, in one particular, that the great mass of people never had any medical aid, not

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<sup>4</sup>For these MSS. see, L. F. Zmiev: *Russkiye vrachebniki*, St. Petersburg, 1896. For abstracts from these and other sources, the writer is much indebted to Mme. Regina Plavskiy, Russian translator in the Army Medical Library, Washington, D.C.

even down to the organization of district (*zemstvo*) medicine in 1864 and long after. The Byzantine priests and hermits were the natural friends of the weak and helpless and presently the inevitable secular healers begin to appear, of whom there is abundant tradition. Meanwhile, czars and nobles begin to import medical aid from Western Europe, but all hope of progress vanished with the Tatar invasion and the menace of the Golden Horde. In 1357, Alexei, Metropolitan of the Greek Church, who had developed some skill in ophthalmology, was called to Sarai, the seat of the Golden Horde, to treat the eyes of a Tatar princess. It is also of record that in 1485-90, the physician Leo, a Venetian Jew, was put to death following the routine procedure of the later Middle Ages, for failing to cure foot trouble in a Muscovite prince; and that Anton, a German, met with the same fate at the Tatar court for similar reasons. The effect of these barbarous retributions was to keep foreign physicians away from Russia for a long time thereafter. During the six centuries 1090-1656, the Russian principalities, as Richter tabulates, were exposed to some forty visitations of epidemic diseases and famine, which wiped out the population and for which no medical aid beyond the possibilities of ordinary human decency was at hand. The earliest of these at Kiev (1090), occasioned a mortality of 7000 in 40 days. Famine followed at Novgorod in 1128, with recurrences in 1187, 1215, 1229 and 1230, depopulating all Russia in 1229. The Black Death (1348-51) was equally ruthless and there were recurrences of bubonic plague in various localities down to the middle of the 17th century. Before the end of the 15th century, leprosy and syphilis had appeared, and scurvy in 1552. For all this there was no help of consequence available.

Before the end of the 15th century, printed books had appeared in Germany (1450-55), Italy (1465), Poland (1465), Switzerland (1468), Bohemia (1468), Hungary (1473) and even Turkey (1488), but printing could not get a start in Russia until more than a century later. In 1548,

Ivan the Terrible had attempted to bring printers into Russia and by 1550, a printing press was established at Moscow; but it is said to have been destroyed by copyists of manuscripts, who feared that it might put them out of business. In 1564, Ivan Feodorov and Peter Timofeyev published the first Russian printed book, the *Apostol*, containing the acts of the Apostles and the Epistles, but they were accused of heresy by priests, activated by the jealousy of the copyists, and fled the country to put themselves under the protection of Sigismund III of Poland. A monument has now been erected to the memory of Feodorov. The first Slavonic Bible was printed at Ostrog (Vollhynia) in 1581 from another Russian press. By 1600, it had issued 16 printed books. Meanwhile, further attempts had been made by the successive tzars to bring in foreign physicians. In the reign of Vassili III (1505-33) Theophil, a Prussian doctor, was captured by General Saburov in Lithuania and brought to Moscow, while the Greek Marcos came from Constantinople and Nikolai Lujey from Lübeck. During the Tzar's last illness (pyæmia from a suppurating boil in the groin), Theophil and Nikolai were called in. When the Tzar asked the latter if he could cure him, Nikolai replied that being no God, he was not able to raise the dead. The Tzar then turned to his boyars with the verdict: "Nikolai has pronounced my death warrant." Soon after, he was no more. Nikolai was, however, not punished for his blunt honesty, and his colleague Theophil was still active at the court of the successor to the throne, Ivan IV (1533-84), called the Terrible.

In 1537, when Ivan was only seven years old, Hans Schlitte, a German living in Moscow, was authorized by the regency to round up whatever artists, jurists, physicians and mechanics were available in Germany and bring them into Russia. He assembled no less than 120, of whom four were physicians, two operating surgeons, eight surgical dressers, eight barber-surgeons and four apothecaries. But through the machinations of the Hanseatic League and the Livonian Order, these "bearers of culture" were held up

in Lübeck and at Riga, and only a few managed to escape jailing and slip in (Dörbeck). In like manner, Sigismund of Poland tried to induce Queen Elizabeth of England to ignore Russia, but she declined, so that in 1557, two English physicians, Standish and Richard Elmes, were brought in by the Russian ambassador.

Standish is listed in Munk's Rolls as a Cambridge graduate of 1542-71, who had served as proctor of the University in 1551-2, got his M. D. in 1553, and was licensed to practice by the Royal College of Physicians in 1556. He was well received by the Tzar, who dined him several times and gave him 70 roubles, a set of sables and a horse to ride. Elmes, probably an apothecary, incurred the wrath of the "terrible" Tzar for some offence and was returned to England in 1584. From this time on, there was a steady, gradual and ever increasing infiltration of English, German, French and other foreign physicians into Russia, and their fortunes varied. Some were loaded with presents, as ordinarily, and later given their *exequatur* for some misdemeanor. Others, such as Erskine and Lestocq, managed to gain and retain a footing at court, or, like Struensee in Denmark, became influential wire-pullers in affairs of state. Much of the earlier medical history of Russia is cluttered up with accounts of the *res gestae* of these foreign physicians, who, as Dörbeck notes, began to arrive in droves in the years 1616, 1631, 1661 and in the seventies and eighties of the 17th century. Like most European doctors of the Middle Ages and the Renaissance, they existed for the benefit of royalty, the nobility and the hangers on courts and did little or nothing for the people. In view of the continuity of this process of medical immigration, Olearius was impelled to express his conviction that "the Russians have doctors and hold medicine in high esteem"; but down to very recent times, medical graduates have been distrusted by the peasantry as minions of bureaucracy (*tehinovniki*). Of the incomers from England, Dr. Reynolds, who followed Standish, got a salary of 200 roubles, his apothecary, Thomas Carver, who perished in the Moscow fire of 1571, got 100 and the accompanying surgeon 50. Elisaeus Bomel, a Westphalian astrologer, who had been jailed in England for sorcery, got in 1570, but having plotted against Ivan IV, was burned at the stake and then cast into the Kremlin to die horribly (1581). Bomel was followed by Dr. Robert Jacob (1581), who proposed Lady Mary Hastings as a seventh wife for Ivan the Terrible, but upon the death of the Tzar, returned to England in 1584. Jacob was followed by Dr. Mark Ridley, who was recommended to Boris Godunov by Elizabeth, and remained in Russia four years (1594-8). His successor was Dr. Thomas Willis, who came over in 1599, but was speedily dismissed for apparent negligence in bringing in drugs and instruments. By this time, to send a physician to Russia was regarded as the most suitable present a foreign prince could make to a tzar. Dr. Carbenarius was sent in by the Emperor of Germany, Coster von Rosenberg by the King of Sweden, Engelhard by the Elector of



Brandenburg, Polidamus by Prince Maurice of Orange, Sybelist by the Duke of Holstein, Pauw by Henry of Nassau, Anderson by the King of Denmark, and James I of England sent in Arthur Dee, son of the famous astrologer, who remained in Russia twelve years (1621-34), got 1400 roubles a year, an allowance for rations and forage, a town house of brick, a country seat, and was loaded with costly sables<sup>5</sup> by the Tzar Michael Romanov (1613-14) upon his departure.<sup>5</sup>

The first Russian pharmacy was started by an English apothecary, James Frenchnam (1581), who returned to England in 1583, but brought in more drugs under Boris Godunov in 1602. This was, in fact, the starting point of the *Aptekarsky Prikaz* or Board of Pharmacy (1620), the function of which was to supervise and control the acquisition, study and distribution of drugs. At the *Aptekarsky Prikaz*, the doctors bought their drugs and then sold them to their patients, but it had no control over physicians themselves. In 1678 this center had a personnel of 5 Russian physicians, 2 master apothecaries, and 8 apprentices. By 1800 it had 58 physicians and a number of student apprentices. It was the germ of the *Zemstvo* organization of medical aid for the provinces (1864).

With the accession of the Romanov dynasty, government and the social order became more stabilized, there were fewer wars and popular uprisings, life became more tranquil, the cultural level began to rise imperceptibly and there were some faint signs of aspiration to a better order of things. At the end of the 16th century, the first Russian medical publication was printed, a Polish condensation of a Latin medical treatise ascribed to Buturlin, which was followed by a book on hydrotherapy (*Vodnik*) a translation of the Aristotelian *Problemata* and a mathematical compend containing some anatomical matter. The *Benign Cooling Herbal* (1534) was printed from the MSS. in 1616. From the time of Vladimir (972-1015), there was a crude

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<sup>5</sup>For further details about the foreign physicians, see Richter *passim*, A. Brückner: *Die Aerzte in Russland bis zum Jahre 1800*. St. Petersburg, 1887; and E. G. Baldinger's *Russische physisch-medicinische Litteratur*. Marburg, 1792, a bibliography of the writings of German physicians in Russia from Peter the Great to Catherine II.

expertise in the matter of crime in public courts, the procedure of which was summarized in the Code of Ivan IV. The first medico-legal examination by a physician was made by Maghel in 1537, on the status of a prince who assigned illness as a reason for not appearing at the Muscovite court. The first judicial autopsy was made in 1623. Michael Romanov tried to improve the status of physicians by raising them to the nobility but failed through the native distrust and dislike of foreign doctors and the intolerance of the clergy. In the reign of Michael's son, Alexei Michailovich (1645-76), the Sobor Code of laws (1649), designed for the benefit of the small nobles and middle classes and printed in an edition of 2000 copies (1650), occasioned great bitterness among the boyars, the clergy and the peasantry. The poverty engendered by the extensive circulation and counterfeiting of copper money caused a free silver agitation up to 1663. The raids of the Don Cossacks of the Volga under Stenka Razin (1667-71) gave trouble up to his capture and execution. Alexei was succeeded by the third Romanov, Feodor Alexievich (1672-82) who was followed by the Tzaritsa Sophia (1682-9) during the minority of Peter the Great. Tzar Feodor put up at public expense a hospital, which had a staff consisting of an attending physician and a number of surgeons who conducted a five-year course of instruction for student apprentices. These were taught Latin, anatomy, physiology, pharmacy and the art of prescribing, had to pass an examination to acquire a medical degree and were paid a regular salary during their period of apprenticeship. Prior to this institution, a school for the medical instruction of thirty sons of members of the Tzar's Imperial Guard (Strelitz Regiment) had been founded in 1654, but this remained a mere idea and was soon forgotten during the wars and political disturbances that followed. In 1672, the *Aptekarsky Prikaz* became the *Aptekarskaia Palata* (Pharmaceutic Chamber).

With the reign of **Peter the Great** (1694-1712), there came a new order of things. As a boy, he was remarkably

apt in studies and later picked up all he could from officers of foreign birth. In pursuance of his plan for building a Russian navy, he travelled in Germany, Holland, England and Austria and not only brought in new ideas, but initiated the cultural interchanges between Russia and the West which went on continuously thereafter. To bring education into Russia, he sought "a window into Europe," made friends with foreigners, organized his state on the European plan and engraved on his private seal the noble motto: "I am of those who seek knowledge and are willing to learn." In connection with his great Northern campaigns (1699-1721), which marked the decline of Sweden and gave Peter his coveted port on the Baltic, he built a new capital, reorganized his army and gave it a real medical service. As a matter of discipline, he transferred the whole aristocracy and landed gentry to life service in the army and navy as enlisted men, not more than one-third of the nobility being admitted to the civil service; while all, whether aristocrat or plebeian, had to begin at the bottom of the scale of fourteen grades or *tchins* and work their way toward the top. Under this bureaucratic arrangement, nobles and commons alike became *tchinovniki* (1722). In 1703, Peter started the Moscow News (*Moskovskia Viedomosti*), the first Russian newspaper, ordered translations of foreign books, including one on etiquette, founded technical and special schools, and in the last year of his life, created the Academy of Sciences (1724) which was opened on January 7, 1726. While in Holland, Peter had apprenticed himself to the art of ship-building and during his European travels, he picked up all the training he could get in medicine and surgery. He is said even to have opened abscesses, tapped dropsies and couched cataracts on his own subjects, sometimes with untoward results.

In Amsterdam, Peter purchased Ruysch's Anatomical Museum and his secret process of injecting cadavers at enormous cost. By an ukase of May 25, 1706, he created the Court (Military) Hospital, the first real hospital and medical school (1707) in Russia. During his reign, ten additional large hospitals, 500 lazarettos and a number of royal drug depots, large and small, were constructed. In 1712-14, the old *Aptekarsky Prikoz* at

Moscow was reorganized as a Pharmaceutic Chancellery (*Aptekarskaya Kantzelaria*). Over this Chancellery, Robert Erskine, a Scotch physician who became *Leibmedik* to the Tzar (1713) and curator of his anatomical cabinet, was called to preside with the title of *Archiater* (1716). In 1711, the budget of the Chancellery was fixed at 50,000 roubles, with a salary list as follows: *Archiater* 3000 roubles; *Leibmedik* 600-800 roubles; *Leibchirurg* 600 roubles; *Hofmedik* 700 roubles; city physicians and surgeons 400 roubles each; first apothecary 600 roubles; court apothecary 400 roubles; professor of anatomy 800 roubles; professor of natural history 500 roubles. By an ukase of November 2, 1701, Peter had ordered the erection at his own expense of eight private apothecary shops for small town purposes, which were said to have been very successful. To these were added the first public pharmacy in St. Petersburg (April 1, 1706) and two new royal pharmacies at Moscow (1707), one built over its old site in the Kremlin, the other a new building of stone near the Red Gate; with a budget of 20,000 roubles and forty assistants. Similar centres were started at Kazan, Glucov, Riga, and Reval. In 1766-7, an ukase was issued for the improvement of field and garrison pharmacies. In 1706, there was a botanic garden in Moscow and by 1714-19, three in St. Petersburg. In 1718, royal privilege was accorded to run plants for the manufacture of sulphuric and nitric acids. By the Army Regulations of 1716, Peter reorganized its Medical Service as follows: A surgeon general and apothecary general, with two field pharmacies for the whole army (200,000 regulars and 75,000 Cossacks); a physician and staff for every division; a surgeon for every regiment; a feldscher for every company. The Navy Regulations of 1720 made similar provisions for his fleet of 48 warships, 800 smaller craft and 28,000 sailors.

Peter founded the Moscow Hospital (1706) and Medical School (1707), a Hospital for Invalides (St. Petersburg, 1715), an Admiralty or Naval Hospital (1715-16), a Dry Land Hospital (1717, rebuilt 1733), a Military Poorhouse and a Hospital for Foundlings. The hospital fund for these military institutions was deducted from the pay of officers. All his life, Peter took the keenest interest in medicine and was in constant association with his body physicians, Nicholas Bidloo (1702-35) and Robert Erskine (1706-18). Through their influence, he was doubtless led to reprint the *Aphorisms of Hippocrates* (1742) and Bidloo's *Anatomy*. Early in his reign, Peter Vladimirovich Postnikov was sent to Italy to study medicine (1692) at royal expense and graduated at Padua in 1694, the first Russian student to acquire a foreign degree. He was followed by Gregory Volkov, who went to Padua in 1698. At the same time, German and Dutch physicians were imported in large numbers for service in the Army and Navy.

All in all, Peter the Great may be regarded as the creator of Russian medicine. In his determined effort to lift his country out of a certain dreary provincialism, he was the

Roosevelt of Russia and, in every sense of the word, a truly great man.

The interval between Peter and Catherine II was a period of relative decadence. For nearly seventy years, Russia was destined to be ruled by women and all these women, not entirely excepting the great Catherine herself, were under the sway of favorites. Catherine I (1725-7), the widow of Peter the Great, was dominated by Menshikov; Anna Ivanovna (1730-40), daughter of the short-lived Ivan V, was infatuated with Biron (Büren), who filled the court with foreigners; Anna Leopoldovna (1741) was guided by Münich and Ostermann; and Elizabeth Petrovna (1741-61), the daughter of Peter the Great, under the sway of Lestocq, made a clean sweep of all the favorites, but was secretly married to Prince Rasumovski (of the Beethoven quartets) and was tagged by Frederick the Great with an epithet which cost him dear<sup>6</sup> in coping with his "world of enemies." Elizabeth was in reality, a woman of remarkable good looks, but fat, indolent, sensual, good-natured, "fond of horse-flesh and low company" often feline and cruel to other women, but otherwise gracious enough, and probably not as black as painted. The effect of all this succession of trivial tzaritsas was to create a reactionary bureaucracy which, however favorable to the arts, did little for science, medicine or social welfare. In the Seven Years War, the Russian infantry gave a good account of itself, defeating Frederick's platoons at Gross-Jaegersdorf (1757) and Kunersdorf (1759), but the frame

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<sup>6</sup>The old soldier's growl about *l'infâme catin du Nord*. "Friedrich's wit," says Carlyle (XIII, 8) "cost him dear; him, and half a million others still dearer, twenty years hence." Yet, in spite of the very favorable view expressed by Sir Charles Hanbury Williams and other Englishmen who had audiences with this Tzaritsa, Carlyle follows his hero as usual: "An indolent, orthodox, plump creature . . . not an ounce of nun's flesh in her composition, said the wits" (XII, 8); and again: "Mainly a mass of esurient oil, with alkali on the back of alkali poured in . . . till by pouring and stirring, they get her to a state of soap and froth" (XVII, 1). Apart from the acrimony and prurient interest excited by Freudian repressions, we now judge of the *fredaines* of great dames of the past according to the dictum of the old dramatist: "She's never lewd that is accounted great"—the program handed to young Catherine II, when she came to the Russian court.

hospitals erected by Peter the Great had long since collapsed and even before the reign of Tzar Paul, what remained was more pitiful than the bogus clapboard villages of Potemkin. Not a single hospital of 200 bed capacity was to be found in the realm, nor had any of them wards in which the patients could be protected from wind and rain. The Naval Hospital at Cronstadt was fully destroyed and the Army Hospital at Moscow so little adequate to its purpose that a report of January 1, 1797 records finding two patients in a bed. Half the patients in a military hospital or a marching command died automatically from disease and neglect. Many of the civil service reforms in Peter's Table of Tchins were annulled, so that the nobility regained certain privileges at the expense of the Army and the peasantry. The University of Moscow was founded in 1755. In 1761, Elizabeth again sent ten Russians to Holland to study medicine and some of these, such as Pogoretski, Jagelski, Timkovski and Fialkovski became prominent in very creditable ways.

The most important figure in the history of Russian science in the 18th century was:

Michael Vasilievich Lomonosov (1711-65), one of those men of universal genius who might have been the regenerator of his country had the time been ripe for his message. The son of a poor fisherman, he memorized what rude primers he could get hold of and ran away to Moscow, concealed in a wagonload of fish, without a kopek in his pocket. Through the charity of a monk, he got into school, where he did so well that he was passed on to the Academies at Kiev (1735) and St. Petersburg (1737) whence he was sent to Marburg for three years. Upon his return, he was forcibly enlisted as a soldier in Frederick's Army, but managed to get back to St. Petersburg in 1741, where he became adjunct professor of chemistry in the University (1742). In 1751, the Tzaritsa Elizabeth made him full professor and, in 1760, rector of the University. Flattered by an ode, Catherine II made him a counselor of state (1764). He was an able chemist and mathematician, a grammarian and a poet, who wrote so well that he is styled "the father of Russian literature." He wrote a chronology and a history of Russia, a Russian grammar, an epic on Peter the Great, two tragedies, an epistle on the utility of glass and made contributions to chemistry, metallurgy and physics which were highly praised by the mathematician Euler. His letter to Shuvalov on the conservation of Russia stresses the great need for physicians and drug stores, "of which there are none, so that many who should be alive are dead." But all this

fell upon sterile ground and Lomonosov was not to be appreciated until a century later.

Catherine II (1762-96) patterned herself after Elizabeth and even surpassed her as the *grande amoureuse* of history. The reign of Catherine II lasted 34 years and was marked by a great show of theoretic liberalism, based upon her sympathy with Montesquieu, Diderot and the other political and social doctrinaires of France. This was found to work well in the development of literature, the fine arts and the ornamental phases of Western European civilization, but was speedily abandoned when she found her ideals conflicting with those of the upper classes who supported her. A great commission of 652 members of all classes of society was convened to canvass social problems, the vast regional units established by Peter the Great were broken up into governments and districts, the vast properties of the church were secularized as government domain, education for the better classes was forwarded and even emancipation of the serfs was considered, but this was all vain show and ended in smoke. Catherine's parade of liberalism was like the clapboard phantom villages which Potemkin ran up along the Dnieper to delude his sovereign during her triumphal progress into the Crimea. Under Catherine, Russia acquired the Crimea and the Baltic Sea provinces and such annexations went on unimpeded up to the Russo-Japanese War of 1905. In Panin, Catherine had an astute foreign minister and in Suvorov, a general who never lost a battle. The rebellion of Pugachev, a Cossack outlaw who tried to duplicate the success of the False Demetrius (1773), was put down after two years fighting. Disturbances of this kind became the signal for harsh reactionary measures. Catherine's reign was thus rather a cultural awakening, a phase of 18th century "enlightenment," than a true progression toward economic and social betterment. In this period flourished Lomonosov, Derzhavin, the historian Stcherbakov and other writers of note. Catherine was liberal toward her flatterers and generous in her medical endowments. It was part of her program of "enlightenment" to establish social service institutions,

hospitals, homes for the feeble minded and a "Medical Commission" to coöperate with provincial governors in securing physicians and drug stores for the cities. At the instance of Voltaire, she and the grand duke Paul were inoculated against small pox by Thomas Dimsdale, who got \$60,000, a pension for life (\$2500) and the title of Baron for his trouble. In 1763, the St. Petersburg branch of the *Aptekarsky Prikaz* was converted into a Medical College, which, in 1835, became the famous Military Medical Academy. To Moscow, Catherine gave the Catherine, Galitzin and Pavlovski Hospitals and a foundling asylum (1764); to St. Petersburg, another foundling asylum (1770), an insane asylum (1776), a "Secret" hospital for venereal diseases (1763) and the Obukhovski Hospital (1784). In Catherine's reign, Shafonski published his account of the plague of 1769 and Ambodik introduced the use of obstetric forceps. In 1795, General Suvorov turned into the old Zaluski Library (opened to the public in 1747), some 260,000 volumes and 10,000 MSS., captured as booty in wars, and thus started the Royal Public Library of St. Petersburg. Hundreds of valuable private collections and all the books and pamphlets printed annually in Russia were added to this great library, which now numbers nearly 5,000,000 printed items and 3,310,100 MSS.

Catherine's son and successor Paul (1796-1801) whom she kept in leading strings for over forty years, was timid, inexperienced, bigoted, narrow-minded, militaristic, hence incapable of the specious play of liberalism which had made Catherine popular, and so was doomed beforehand to assassination. Apart from the military successes of Suvorov, his reign had nothing to its credit, indeed was so tyrannical that it was called the "Reign of Terror." Nevertheless, under Paul, some improvements in medical administration were instituted in the provincial governments. The Collegium Medicum (1763) became the Medico-Chirurgical Academy (1798, opened 1800) and the old Moscow Hospital was ordered to be rebuilt. The first president of the Medico-Chirurgical Academy (1804-35) was Sir James Wylie (1768-1854), an Aberdeen graduate, who entered



the Russian Army Service as senior surgeon to the Eletsy Regiment (1790), and became physician to Tzar Paul (1798-1801). The Academy became the Military Medical Academy in 1835. In 1808, Wylie became Inspector General of the Army Medical Board of Health, served through the campaign of 1812-13, and was first director (1812-36) of the Medical Department of the Ministry of War (organized 1811). In 1891, a Clinical Hospital was constructed from funds left by him and was named after him. Wylie wrote on yellow fever (1805), scabies (1811), plague (1829), cholera (1831), conjunctivitis (1835), published a *Pharmacopœia Castrensis Ruthenica* (1808), and did much to improve the status of Russian hospitals.

With the accession of Alexander I (1801-25), who was confronted by the full swing of the Napoleonic wars, Russia assumed a rôle of domination in European affairs never realized before or after. This was due to the character and ability of the Tzar, who, from Tilsit to Waterloo, was the ablest political opponent of Napoleon and the chief agency in his downfall. Like his great grandmother, Alexander was a liberal at heart and sensible enough to utilize his counsellors, Adam Zartoryski, Stroganov and Speranski. He repealed the tyrannic ukase power of the senate and gained universal approbation through his cheerful, courteous exterior, his self-possession ("the Charming Sphinx"), and his general good nature. But the events of 1812 left their mark upon him and with the Holy Alliance (1815), he became suspicious, distrustful and negative, if not reactionary, in regard to the aspirations of the masses. The result was the formation of secret societies, which came into being about 1816, and the "Decembrist" revolt of troops, which followed hard upon the death of the Tzar (1825). His successor, Nicholas I (1825-55) was a blunt, unimaginative soldier, merciless as Arakcheyev (his father's martinet) with subalterns and given to terrorizing his subjects by glaring them down in the street. He crushed the Decembrist and Polish insurrections with the utmost rigor, created a censorship of the press and a secret police system,

held up travel by expensive passports and alienated, or even exiled, the nobility by a despotic bureaucratic regime. He increased his territory by his Persian and Turkish campaigns (1826-9) and died during the Crimean War (1855).

During the half century following Catherine's reign, many changes had come to pass in European medicine. France, through such eminent masters as Bichat, Laennec, Louis, Bretonneau, Bouillaud, Corvisart, Andral, Rayer, Ricord, Pinel, Alibert, Cruveilhier, Magendie, Flourens and Poiseuille, had virtually created much of modern medicine and under Louis and Chomel were trained Holmes, Gerhard and others who did so much to make medicine a going concern in our Eastern states. Great Britain had such great clinical pathologists as Bright, Addison and Hodgkin, Graves, Stokes, Colles, Robert Adams and Corrigan. German medicine, following the Revolution of 1848, had given over the romantic doctrines of the Natural Philosophy School, had crossed the Rubicon to gain the land of *Sachlichkeit* (reality) and already gloried in two new stars of the first magnitude, Virchow and Helmholtz. In Russia, things were moving at a much slower pace. As early as 1721, Blumentrost, then Archiater, had put through the Senate a drastic law against quacks, yet 50 years later, the apothecary shops in St. Petersburg were receiving prescriptions from unknown "physicians," who had never been examined for the *venia practicandi*. The hospitals of Peter's reign had fallen into decay, indeed the over-crowding and squalor in the larger hospitals were as bad as in the Hôtel Dieu. So shocking were the conditions in the Moscow Hospital that the Tzar Paul ordered its reconstruction (1797), a new hospital for 1280 patients being completed in 1802. Even so, half the patients in hospital died and in a marching command of 300 recruits, 150 died *en route* and the rest died in the hospital after reaching their destination. The incoming foreign physicians were either too inexperienced or too old to take up private practice and those who succeeded were often plain barber surgeons. By 1804, there were five university medical faculties in Rus-

sia, viz., that of the old Moscow University (1755), the Medico-Chirurgical Academy (1798), that of the University of Dorpat, founded by Gustavus Adolphus in 1632 and reorganized in 1802, and those of Kharkov (1804) and Kazan (1804). The University of St. Petersburg was opened in 1819. But, apart from the Military Medical Academy (1835), at which most of the greater medical men of Russia were educated, the medical teaching at these institutions was poor and feeble in quality, even in the comparatively late period when Pirogov and Botkin were students (1850-55). Of the Moscow teaching, Botkin relates that most of the professors had completed their medical education abroad and merely read off, in perfunctory fashion, lectures about what they had learned, lectures written sometimes ten or fifteen years before. Of practical training, apart from rare bouts of dissecting and a few examinations of patients, there was none. "Our future" says Botkin, "was ruined by our teachers, who conveyed knowledge in the form of categorical verities, without giving us any incentive to original investigation whatever." Ower, professor of internal medicine, was so busy with his extensive practice that he seldom gave more than 6-8 lectures in an 8 months' course; while his assistant, as also Toporov, professor of special pathology and therapy, looked upon percussion and auscultation as a "swindle." Pirogov records that, during his entire period of medical study at Moscow, he never once dissected a single subject. The deltoid muscle was demonstrated by tying a strip of cloth to the proper points of attachment on the skeleton. Lectures on chemistry, surgery, pathology were delivered in Latin from obsolete 18th century text-books. There was no objective teaching whatever. While a few, such as the anatomist Loder, the zoölogist Fischer and the botanist Hoffman, were worthy of their calling, this state of affairs persisted from the coronation of Alexander II until the death of Nicholas I (1855) and after. In Germany, Pirogov found such surgeons as Graefe, Dieffenbach and Rust to be woefully deficient in anatomy, and although Ower had a pathological museum, and a fine collection existed in

the Moscow University, there was no chair of pathology until 1849, when the subject began to be forwarded under the inspiration of Virchow. The truth is that the Russian people, exhausted by the Napoleonic Wars (1812-15) and cowed by the tyrannies of Nicholas I, lacked the enthusiasm and interest necessary for the advancement of science. The most important medical men of the period before the introduction of organized district (*zemstvo*) medicine were:

The great embryologist Carl Ernst von Baer (1792-1876) who was born in the Baltic Sea provinces (Esthonia), published his monograph on the development of animals in the Memoirs of the St. Petersburg Academy (1828-34), is accredited to the Russians as a native son and, indeed, devoted most of his life (1834-76) to investigating the anthropology and physical geography of the country.

The reformers Constantin Ivanovich Stchepin (1728-1800), who introduced mineral waters and induced the government to abolish physical punishment of school children, but coming under the ban of persecution, took to drink and died of alcoholism; and Peter Podgoretzky, who on account of his critiques of the deficiencies in medical education, was given a post in Siberia to get rid of him. After his departure, the Medical School of Moscow University began to go into decline. In later years, it became a seat of literary and philosophic culture, while science thrived best at the University of St. Petersburg (1819) and the Military Medical Academy (1835).

Ivan Petrovich Vennsovich (1769-1811) was called to the first chair of physiology in the University of Moscow and published a treatise on the subject. The first professor of theoretic medicine in Moscow University was Semen Hirassinovich Zybeline (1765) who, in his work on the constitution of the body (1777), advanced strange views as to its chemical make-up, notably that disease is a "cacochemie" process. Matvei Mudrov, the leading Moscow physician of his time, mentioned in Tolstoi's *War and Peace*, published the first Russian Manual of Field Surgery, lectured on military hygiene and strove for the autonomy of Russian medicine. He was a Brunonian up to 1824, after that a follower of Broussais. Ustin Diakovsky (1784-1841), who held the Moscow chair of theoretical medicine (1831-5), made a classification of diseases (*Systema morborum*), did important work on cholera and first strove to free Russian physicians from the thralldom of foreign influences by developing novel theories of his own. In these, he displayed originality of a bizarre species but little common sense, for instance in his odd views of material and "dynamic" lines of treatment. These *dynamidia* covered such absurdities as encouraging the filthy habits of the insane, when they were irritable, or the view of anger as psychic (promoting hepatic activity and the secretion of bile) and organic (due to hepatic irritation and injurious to the organ).

**Lebediev** adjunct professor of theoretic medicine, advanced equally fantastic views of the structure and chemical composition of the foetal and adult body in his "General Anthropopathology" (1835) albeit with some glimmering of the biochemic theory of irritation, the biogenetic law of Haeckel and Virchow's theory of inflammation (attraction).

Alexander Ivanovich **Ower** (1804-64) who held the chair of clinical therapeutics after Mudrov, tried to improve himself in pathological anatomy and made a collection of specimens.

Justus Christian **Loder** (1753-1832) of Riga, was director of the Moscow Hospital (1813-17) and lectured on anatomy up to 1831. He published an Anatomical Atlas (1797-1803), several anatomical treatises and an introduction to physical anthropology. His bust and his collections are in the Anatomical Institute he founded.

Gregory Ivanovich **Sokolski** (1807-86), who held the chair of special pathology (1835-48), was the most remarkable of the Moscow internists. His book on diseases of the chest introduced percussion and auscultation and is notable for its sound rational views of things. "It is easier to rationalize and indulge flights of fancy than to investigate the physical properties of things. Inexperienced youth applauds a chimæra and the aim of the theoretical pundit is attained."

Fedor Ivanovich **Inozemtzev** (1802-69), son of a Persian prisoner, was another passionate protagonist of the autonomy of Russian medicine, a fanatical adherent of solidist pathology and of the view that diseases had changed in character since 1840 (*genius morborum*). Formerly they were of inflammatory character, requiring venesection, purgatives and cooling remedies; now irritation of the nervous system, manifesting itself as gastritis (Broussais) predominated, and for this Inozemtzev gave a standard specific, compounded of ammonia and tartar emetic, which was mixed in large quantities by the nurses. His main titles to fame are his pupil Botkin, the *Moscow Medical Journal* (*Moskovskii vrachebnii Journal*) which he founded, and the Society of Russian Physicians (*Obshchestvo russkikh vrachei*) in Moscow, which he organized.

Plainly the internal medicine of the period did not amount to much, but better beginnings were made in surgery at the Military Medical Academy of St. Petersburg (1835). The development was forwarded by the exclusively military character of this institution and above all through its magnificent medical library, then the largest of its kind in Europe. The first professor of special pathology and therapy in the Academy was Conrad Frederick **Uden**, who started a journal of dietetics, which was opposed by the clergy and finally appeared under Count Zuboff's protection as the *Petersburgskoye Vrachevnyi Vedomosti* (1792-4) the first Russian medical periodical.

Karl **Seidlitz** (1799-1885) of Reval, was a great reformer of medical teaching, developed microscopy, clinical chemistry and post-mortem examinations, employed palpation and auscultation and left an early account of

Weil's disease. He was an original thinker on the nature of phthisis, prescribed baths in typhoid fever and employed quinine in malaria.

The pioneer of surgical work in the Academy was Ivan Feodorovich **Busch** (1771-1843) who published the first Russian manual of surgery (1807) and had as pupils Pelikan, Savenko, Salomon, Gaevski and Buyalski. Salomon was the first in Russia to ligate the internal iliac artery and to perform lithotripsy.

Physiology was developed in the Academy by **Zagorsky** and pathology by Nicholas **Zdekauer** (1815-97) who founded the first cholera commission in 1866. The study of chemistry and physics was inaugurated in the Academy by Nikolai Nikolaievich **Zinin** (1812-80) who early sensed the future importance of these subjects, while Alexander **Dubovitsky** (1815-68) made equally important efforts toward substituting a scientific staff for a hollow bureaucracy.

Alexander II (1855-81) came to the throne at the end of the Crimean War, which had humiliated his country and exhausted its resources. Russia began to recede from the dominant position she had taken with reference to continental European affairs and Alexander bent his mind upon internal and social problems. He was a liberal, who surrounded himself with liberal ministers and through his great achievement, the emancipation of the serfs, the abolition of the corrupt legal system and the creation of the great network of district assembly or *zemstvo* government, he was known as the Liberator. By 1871, Reutern, his minister of finance, had put the country on a sound financial basis, but the Second Polish insurrection (1863-4), the attempted assassination of the Tzar in 1866, the acquisition of new Asiatic dominions, the building of Vladivostok, the activities of Herzen and Bakunin, the rise of the Nihilists and the war with Turkey (1877-8) made for reactionary measures, such as compulsory military service (1874), and the Tzar was assassinated by a hand grenade on March 2, 1881. In this period, Russian literature rose to a great height, and Russian music was already beginning to convey its charm through the work of Modeste Moussorgsky (*Boris Godunov*), Glinka and Anton Rubinstein. In the reign of Nicholas I, the world had come to know the poets Pushkin and Lermontov, the fabulist Krilov, the novelist Gogol, and the historian Karam-

sin, but now came Turgeniev, Tolstoi, Nekrasov and the great chemist Mendelejev. The novelists, in particular, threw much light on the social (actual) status of Russian medicine up to 1864. The problem of supplying medical aid to such a vast population had proved insoluble and came to be regarded as negligible. A Russian village could not then and can not even now maintain a doctor. Such devices as the half-way doctor (*feldscher*), the flying corps of oculists and other specialists, were inadequate fugitive expedients and 99 per cent of the population went through life without any conception or experience of medical aid. The Army alone was well supplied with physicians and the main development of Russian medicine in Pirogov's day was military. When a doctor did appear in a Russian village he was besieged on all sides, everywhere and nowhere, sought by all, hence seen by few, had no time to make anything but a superficial diagnosis, never saw his patients again, and, as happened with the "visit and a bottle" plan of the English panel system, his efforts resulted in lost motion and waste of time. He could do good only when accompanied by an ambulance, with *feldschers* and a drug chest. A physician settling permanently in a rural district left it in disgust, since the peasants regarded him as a meddlesome, intrusive clerk or bureaucrat, whose duties, such as the commitment of the insane, constituted a public nuisance. The few hospitals, which existed here and there, were now in horrible condition as to appointments and sanitation, and no peasant who entered one ever came back. Only conceited, restless pseudo-physicians, attracted by the fictitious responsibility and the semblance of great activity ("the fictitious majesty of a wading waterfowl"), could put up with such a life. All these traits were deftly noted and subtly conveyed by such men of genius as Pushkin, Lermontov and Gogol, who made these half-baked physicians ridiculous as ignorant *tehinovniki*.

It was reasoned that the cause of all this was serfdom and satrapry, since the serfs were regarded as an index of wealth, to be replaced by breeding after devastating epi-

demics, whence the only way to give them medical aid was to take it to them by administrative methods. The Tzar therefore emancipated the serfs (1861), did away with the corrupt courts and established territorial self government all over Russia, by means of electoral assemblies in the thirty-four government provinces and their component districts, with provisions for local administrative control of medical aid. This was accomplished by abolition of the old Pharmaceutic Chancelleries of Peter's time, by the taking over of 335 hospitals (11,309 beds) from 359 districts of the thirty-four governments, with 53 smaller hospitals (3,448 beds), all in wretched condition, and by an attempt to replace them by better institutions, with better and more competent personnel. This was a large order, covering an area of 2,845,420 square kilometers, with a population of 66,545,635 inhabitants, and looked well on paper. Even Pirogov believed that "*Zemstvo* medicine ought to combat the ignorance of the masses and change their way of looking at things." It was found that the budget allotted was nowise sufficient to rebuild or to repair the 388 hospitals and even the business of taking them over occupied 5 years (1865-70). Meanwhile, the *zemstvo* authorities turned to the task of reorganizing means of combatting epidemic diseases, building upon the faulty procedure of the Committees of Public Health (organized 1852). This lost itself in red tape and paper work, while the peasants preserved a stolid silence about disease foci in order to dodge the high cost of drugs, treatment and other contributions levied upon them, so that the district physician usually arrived to find the epidemic over. Yet by 1890, the *Zemstvo* had 1422 medical centers in 359 districts, with 1068 hospitals (26,571 beds) and 414 dispensaries, a total personnel of 1805 physicians, 8046 assistants and 2454 midwives. In 1897, 46,195 patients had been cared for in hospital, 1,380,889 ambulant patients had been treated in the dispensaries, 836,418 visits had been paid to 13,178 patients, 6466 labor cases had been handled in hospital, 2873 at home, and 49,344 persons vaccinated in the Moscow Government alone. This will give some idea of the



vast scope of *zemstvo* medicine, its development in 32 years time,<sup>7</sup> its difficulties in coping with huge, prolific populations, scattered over enormous areas and its relation to the grand scale organization of social medicine attempted by the Soviet, which obviously derives from it.

The physicians who did most for this great administrative network of *zemstvo* medicine were first and foremost:

Evgrav Alexievich **Osipov** (1841-1904), who devoted his whole life to this work. During 1875-95 he was director of the Sanitary Bureau, organized its Statistical Division (1896), analyzed the statistical data of the Moscow Government and worked out the general program for increasing the number of hospitals, creating dispensaries and triangulating by topographic studies the whole vast area under *zemstvo* control. Dmitri Nikolayevich **Zbhanov** (1853- ) published a bibliography of the literature (1890), the first general revision of the data (1894), reports on the medical topography of the Kostroma, Riazan and Smolensk governments and other activities. Ivan Ivanovich **Molleson** (1842-1920) gave up rural practice to organize the first Sanitary Commission at Perm (1871) and to become its first public health officer. Thus backed by government, he carried on his missionary work at Novgorod (1872), Perm (1873-81), Astrachan (1881), Iroït (1882), Perm (1888), Saratov (1889), Tambov (1896), Kaluga (1906) and Voronezh (1911-20) acting as a peripatetic public health officer all over Russia for nearly fifty years. He was, however, almost alone in his endeavors.

Fedor F. **Erismann** (1861- ), a Swiss, who settled in St. Petersburg to practice ophthalmology (1869), gave up his practice to devote himself to such public health activities as school hygiene, the inspection of free night-lodgings, factories and food-products. He was director of disinfection during the Turkish War (1877-8) and established the first Hygienic Laboratory in Moscow (1889).

Fedor P. **Haas** (1780-1853) a Viennese, was the John Howard of Russia. He became a prison physician and devoted his life to the welfare of prisoners. He insisted that prisoners should not be sent to Siberia in chains and was known as the "Holy Doctor." Memorable pioneer work was done by the Medical Society of Kazan (1868) which, after 1870, at the instance of its president, A. V. Petrov, devoted itself almost exclusively to public health activities for seven years (1870-77). But in 1881 was organized the Medical Society in Memory of Pirogov, which took over these activities at Pan-Russian Congresses held at St. Petersburg in 1885, 1889 and 1893, at Moscow in 1887 and 1891, at Kiev (1896) and at Kazan (1899), and at the annual meetings of the local societies. At the fifteenth

<sup>7</sup>For the official account of *zemstvo* medicine, see E. Ossipov, I. Pavov & P. Kourkine: *La médecine du Zemstvo en Russie*. Moscow, 1900.

Moscow-Petersburg Congress (1898), A. V. Molkav was appointed director of a Commission to disseminate hygienic literature among the people. In the famine year (1899), dining rooms, dairies, asylums for child welfare were organized and, in 1900, a Tuberculosis Commission was created under Prof. Schurvinsky. The Pirogov Congress also played a leading rôle in fighting cholera and malaria. Its literary organ was the *Annals of Legal Medicine and Public Hygiene*, edited by A. V. Lavtsov (1865-72) and subsequently appearing under other titles.

But the greatest and earliest pioneer in social welfare activities was Nikolai Ivanovich **Pirogov** (1810-81), who entered the University of Moscow at the age of 14, graduated 8 years later with a dissertation on ligation of the abdominal aorta (1832) and completed his medical education at Berlin and Göttingen, where he was disgusted with the ignorance and indifference of Rust, the elder Graefe and Dieffenbach with regard to anatomy. Conrad von Langenbeck was, in his opinion, the only German surgeon who knew anything of the subject. Returning to Russia in 1835, Pirogov taught for 5 years at Dorpat and was then appointed professor of surgery in the Military Medical Academy (1840). Here he was active up to the Crimean War (1854-5), in which he introduced female nurses for the wounded and served 14 months around Sebastopol. Prior to this event, he had rendered field service to the Caucasus (1847), was, with Syme of Edinburgh, the first European surgeon to employ ether anaesthesia (1847), made 800 post mortems of cholera victims (1848), imported Hyrtl's pupil, Gruber, from Vienna to teach anatomy (1846). In 1851-54, Pirogov published his great atlas of topographic anatomy, based upon frozen sections in three planes and his method of complete osteoplastic amputation of the foot (1854). Pirogov was the life and soul of the Military Medical Academy, which he lifted to a high plane of efficiency through his work in the reorganization of army hospitals and his introduction of dissecting and of pathological anatomy as a discipline (11,000 post-mortem sections). His treatise on military surgery was published in 1864. He was an advocate of greater freedom and higher education for women and, in the face of bureau-

cratic opposition, did his utmost for the advancement of medical education in Russia. He retired from activity a broken man, but emerged reluctantly to report on the Franco-Prussian (1870) and Russo-Turkish campaigns (1877). His memoirs<sup>8</sup> reveal the inevitable Slavic tendency to mysticism. He is regarded by the Russians as the greatest figure in their medical history.

Wenzeslaus Leopold **Gruber** (1814-90) a Bohemian anatomist whom Pirogov imported in 1846 to teach the subject in the Academy, did not join the staff until Pirogov's retirement in 1855, when he became professor of practical anatomy and subsequently director of the Anatomical Institute and Museum, constructed according to his plans in 1871. During the forty-five years of his activity in Russia, he did an enormous amount of research work on human and comparative anatomy, notably on the bursæ, the fasciæ, the muscular and vascular systems, the larynx, the male mammary gland and on abnormalities in man which are normal in certain lower animals. He wrote and lectured in German, assembled a remarkable anatomical museum (1000 crania), admitted women students to the dissecting room and was in close relation with Botkin and Setchenov as a reformer of medical education. His most brilliant pupil was Peter Franzovich **Lesshaft** (1839-1909) who published several manuals and text books, was a pioneer in the advancement of physical training (1886-8) and child study (1890-94), and described Lesshaft's space.

Other Russian anatomists of note were Dmitri Nikolayevich **Zernov** (1842- ) professor at Moscow, author of an elaborate treatise on descriptive anatomy (1890-91) and inventor of an encephalometer (1892); and Yermolaev, professor at Kazan.

*In histology, the outstanding Russian authorities were:*

Alexander Ivanovich **Babukhin** (1835-91), who investigated the histology of the nervous system, the electric organs of fishes and comparative electrophysiology; N. M. **Jakulovich**, who was awarded the prize of the Academy of Medicine (Paris) for his histological researches in 1853; Alexander Stanislovich **Dogiel** and Philip Vassilievich **Ovsiannikov** (1827- ), both of whom did remarkable work on the comparative histology of the central nervous system; and Liveryi Osipovich **Darkschevich** (1858- ) who discovered the nucleus in the Sylvian aqueduct which goes by his name. Dmitri Leonidovich **Romanovsky** (1861- ) devised the well known stain for malarial plasmodia (1891).

The most eminent Russian embryologist was Alexander Onufrievich **Kovalevsky**, who showed the identity of the

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<sup>8</sup>N. I. Pirogov: *Lebensfragen*, Stuttgart, J. G. Cotta, 1894.

early stages of *Amphioxus* and the Tunicates, the constancy of the gastrula stage in all animal embryos and the relation of the medullary tube to the archenteron.

Ivan Michaelovich **Setchenov** (1825-1905) was the father of Russian physiology and neurology. At the same time, he resembled Huxley in his efforts to popularize physiology among the working classes (Pretischensky Lectures). His elementary manual (1898), like Huxley's little book, had an enormous success. Although of very humble birth, he came to be looked up to as an authority, whose word was law, all over Russia. He is remarkable for his discovery of the inhibitory centers of spinal reflexes in the medulla and cord (1865) and his experiments on the physiology of the central nervous system (with Paschutin, 1865). He was succeeded in the Academy by

Elias **Cyon** (1843- ) who in Carl Ludwig's laboratory, discovered the depressor nerve of the heart and the *nervi erigentes* of the blood vessels and the vasomotor function of the splanchnic nerves (with Ludwig, 1866) for which he received the *prix Montyon* (1867). He also investigated the vasomotor nerves and reflexes (1868), the rate of blood flow in the veins (1871), uterine contractions (1874), the function of the semicircular canals (1874-6), the formation of space-perceptions (1877-8) and the innervation of the thyroid gland (1897). He published a text-book of physiology (1873), a book on electrotherapy (1873), which was awarded the gold medal of the Academy of Sciences (Paris), and a manual of physiological methods and vivisection (with Atlas, 1876). In 1872, Cyon was appointed professor ordinarius in the St. Petersburg Academy, which he was called upon to reorganize, but became a political reactionary with regard to Nihilistic students and although ennobled by Alexander II, he was forced to leave Russia to settle in Claude Bernard's laboratory, where he became a naturalized Frenchman. Cyon's greatest pupil was Pavlov.

Another Ludwig pupil was the Lithuanian, Jan **Dogiel** (1830- ) with whom Ludwig invented the *Stromuhr* (1867) and discovered the fact that the first heart sound is partly produced by cardiac muscle (1868). In 1869, Dogiel became professor of pharmacology in the University of Kazan, where he continued his researches on the circulation, the salivary nerves (1893), the nerve fibres (1897) and the histology of the retina and ureter. Among the pupils of Cyon was Ivan Romanovich **Tarchanov** (1848-1909), who discovered the psycho-galvanic reflexes (1890), wrote on the psycho-motor centres (1879), hypnotism (1886), venoms (1888), colds (1899) and (with Poehl) a book on organotherapy (1906). He employed the telephone in electrophysiology, investigated the physiology of sleep, the automatic

movements of beheaded animals, the effect of music on the organism and described the physiological peculiarities of those who can alter their pulse-rate at will (1885). The telephone was also employed by Nikolai Igorevich Vvedensky (1844- ) who is memorable for his work on nerve-blocking, and nerve stimulation (Wedensky effect, 1884).

Of the physiological chemists, Marcel **Nencki** (1847-1901) of Kalisz, Poland, was not only one of the outstanding pioneers in biochemistry, but also, with Panum, one of the earliest and ablest investigators of the bacterial chemistry of putrefaction.

A medical graduate of Berlin (1870) he made himself a master of chemical technique under Bayer at the *Gewerbeakademie* (Berlin) and taught his subject at Berne for twenty years (1871-91), when he was called to direct the laboratory of the Oldenburg Institute of Experimental Medicine at St. Petersburg (1891), where he remained up to his death from cancer. As a pure chemist, Nencki first isolated the guanamines as melamines and various ketones of use in the manufacture of aniline dyes. He investigated the physiological oxidation of benzene and its derivatives and the fate of esters in the alimentary tract, obtaining phenyl salicylate or salol. In bacteriology, he improved the technique of anaerobiosis, isolated indol as a product of bacterial protein degradation in the intestine, showed that hydrolysis is the first stage of protein dissociation, tabulated the decomposition products of putrefaction, showed that bacteria are not necessary to protein digestion, studied the effect of intestinal bacteria on carbohydrates and demonstrated that lactic acid can be produced from sugar in the absence of oxygen. He discovered urorosein (1882), parahæmoglobin (1885), salol (1886), ptyalin (1886), did remarkable work on the blood pigments (1884-6), the purins and proteids (1891), and demonstrated that ammonia is eliminated from protein digestion in the alimentary tract, passing as ammonium carbamate to the liver, where it is converted into non-toxic urea. Nencki was a man of amiable but eccentric disposition, of whom many bizarre anecdotes were related by Naunyn and his other associates. His *Opera omnia* were published in 1904.

Alexander Jakovlyovich **Danilevsky** (1839- ) was the first to attempt to separate the pancreatic ferments (under Kühne, 1862) and did good work on isodynamic foodstuffs (1885). His brother Vassili (1852) wrote on the parasitology of the blood (1888-9) and the physiological action of electricity at a distance (1902). L. P. Borodin, composer of *Prince Igor*, devised a method of estimating urea. A. N. **Bach**, remarkable for his work on blood ferments, has devised a method of estimating them from a single cubic millimeter of blood.

The leading Russian pharmacologists were Dragendorff, Tikhomirov, Pel (or Poehl) and Kravkov.

George Dragendorff (1836-98) of Rostock, held the chair at Dorpat for nearly thirty years and wrote on toxicology (1868), forensic chemistry (1871), chemical analysis of plants (1882) and an unfinished masterpiece on medicinal plants of all peoples and periods (1898), which is of great historic value.

Vladimir Andreyevich Tichomirov (1811- ) investigated the trichinae (1880) and wrote a memorable treatise on pharmacognosy (1888-90).

Alexander Vassilievich von Poehl (1850-98) investigated spurred rye and ergot (1873-83), jaborandi (1880), peptone (1882), overstimulation of nerves as a cause of auto-intoxication (1902) and with Tarchanov, published a treatise on rational organotherapy (1906). In 1891, he extracted spermin (isolated by Philip Schreiner, 1870) from the bovine testes and under the spell of Brown-Séquard, introduced it into practice as a rejuvenant. He ultimately published a big book on the subject (1898-9).

Nikolai Pavlovich Kravkov (1865-1924) a brilliant pupil of Setchenov and Schmiedeberg, became professor of pharmacology in the Military Medical Academy in 1899. His early work covered such varied themes as the biochemistry of carbohydrates, the distribution of glycogen by fungi, experimental amyloidosis (1894), experimental arteriosclerosis, the endotoxin of cholera, yohimbin, diastase, the effect of antipyrin on nitrogenous metabolism and the basal metabolism in poisoning. The publication of his great work on "The Bases of Pharmacology" drew attention to his extraordinary experiments on isolated organs perfused in nutrient media. Kravkov produced inflammation by irritating an excised rabbit's ear perfused with decinormal salt solution. On excised fingers, preserved for months in nutrient media, he demonstrated the growth of hair and nails under perfusion or the production of perspiration by raising the temperature or by infusion of pilocarpine. He performed similar experiments on the organs of patients who had died from different diseases, and obtained normal endocrine secretions from excised ductless glands by perfusion. He isolated pancreotoxin, an effective insulin preparation. His method of obtaining endocrine extracts by perfusion with blood is now employed in Europe.

The Moscow professor, G. P. Sacharov, has borne eloquent testimony to the activating effect of Virchow's teaching upon the development of pathology and experimental medicine in Russia.<sup>9</sup> Up to 1850-60, as we have seen, anatomical teaching in Russia was a farce, and of pathology there was no sign. Dissecting, as routine training, had no existence until Pirogov imported Gruber, and without dissecting, there could be no adequate training for operative surgery. Clinical medicine was in a bad way

<sup>9</sup>G. P. Sacharov: *Arch. f. path. Anat.*, Berlin, 1921, CCXXXV, 329-378.

until a number of Russians, who had come under Virchow's spell, began to filter into practice. One of the earliest of these was Botkin, who testifies that he found Virchow's somewhat intricate lectures diffuse, bewildering and bore-some, a never ending stream of minutiae, difficult to assimilate, for the Russian student, brought up on rigid dogma, could not dissociate hypothesis from matter of fact, nor even make the innumerable facts function along rewarding lines of thought. Such was common experience, for at this time, Virchow's actual teaching was accessible only to a select circle around the post-mortem table. But what Virchow did for the medical world at large was to throw down the false idols of the schools and to inculcate a true scientific method, whereby problems were to be isolated, approached, attacked and invested. To this matter of selecting the most advantageous peep-hole into the ways of nature, Virchow undoubtedly had one important clue, and this clue (his cell-theory), apart from the stimulating catalysis of his very active mind, was to be an important fructifier in the development of Russian pathology and internal medicine. Before Virchow's time, many medical problems had been of the kind ticketed by Ostwald as "illusory problems" (*Scheinprobleme*), and in consequence, certain scientific proofs became "whirligig proofs," and the outcome un-science (*Scheinwissenschaft*).

Before 1849, the University of Moscow possessed a few collections of pathological specimens (in the clinics), but there was no chair of pathology. Up to 1859, Polunin, the first professor of the subject, taught the old humoral pathology. In the winter semester of 1859-60, he posted a course of 20 lectures on Virchow's cellular pathology and had drawings, copied from Virchow's book, hung up in his auditorium. About the same time, Klob, Rokitansky's assistant in Vienna, posted on his blackboard the following notice: "From Thursday on, lectures on pathological anatomy will be delivered according to the cell doctrine of Virchow." By 1860, the influence of Virchow was decisive and ineluctable, a definite catalysis, of which the final product in Russia was Metchnikov.

One of the earliest of the Virchow pupils was Michael Matvievich **Rudnov** (1837-79), who began with serous tubercular formations (1863), worked with Virchow and Kühne on the morphology and chemistry of amyloid degeneration (1865), published a volume of pathological researches on the cholera epidemic of 1866, introduced a new microchemical reagent, studied the epithelium of the frog and wrote an important memoir on replantation and transplantation of bone (1880).

Vladimir Platonovich **Krilov** (1811-1906), professor at Kharkov, investigated pulmonary syphilis (1870), but devoted his main efforts to the pathology of the constitution. Apart from his oral lectures, he did not publish his findings, which are buried in his post-mortem protocols and is in consequence, little known. He classified connective tissue as areolar (reticular), fibrillar and fascicular, and from this viewpoint developed his doctrine of the fibromatous constitution (fibromatosis) of strong muscular framework and massive skeleton; the lipomatous constitution (lipomatosis), with proliferation of areolar and fatty tissue; the gracile constitution, with long fragile bones, flaccid conical heart and thin walled vessels; and the lymphatic or catarrhal constitution, with small heart, narrow vessels, excessive follicular proliferation and atony of the intestinal tract. These four types connote peculiar predispositions to disease.

Sergiei Michailovich **Lukyanov** (1855- ), professor at Warsaw, was in the Virchow trend in his twenty lectures on the general pathology of the cell (1891), investigated functional disturbances of the separate compartments of the heart (1883) and published monographs on the general pathology of the vascular system (1893) and of digestion (1897). In 1886, he started a laboratory in Warsaw and in 1894, became director of the Institute of Experimental Medicine at St. Petersburg.

Michael Nikeforovich **Nikiforov** (1858- ) investigated granulation tissue (1890), embolism, preparation of blood-films and wrote a pathological atlas (1895) and a massive treatise on pathology (1900-1923).

The influence of Virchow on Russian descriptive pathology is further perceptible in the swarm of investigations on the degenerative processes, embolism, thrombosis, leucocytosis, transudates, cloudy swelling and atheroma, notably those of **Abrikossov** on fatty metamorphosis, chalky deposits and predisposition to disease; **E. F. Lyubimov** (1841) on colloid degeneration and the pathology of pseudarthrosis (1867); **Ivan Feodorovich Klein** on thrombosis (1864), spondylolisthetic pelvis (1870) and disseminated sclerosis (1882); **Saltikov** on chalky deposits, inflammation, atheroma and heart disease; **Valerian Podvissotki** (1822- ) on regeneration of glandular tissue in wounds (1886) and partial regeneration of the liver in mammals (1886). With the foundation of the Institute of Experimental Medicine by Prince A. P. Oldenburg in 1890, and its literary organ, the *Archives of Biologic Science* (*Archiv biologicheskikh nauk*, 1892), a definite impetus was given to experimentation. Outstanding in this field were: **Victor Vassilievich Paschutin** (1845-1901), who made his mark by his in-



vestigations on carbohydrate degenerations, infarctions, diabetes, morphologic changes in hunger, his lectures on general pathology (1878-81) and his great treatise on general and experimental pathology (1885-97).

Vladimir Valerianovich **Podvisotski** (1857-1913) investigated experimental regeneration of the liver (1886), parasitic sporozoa (1893), the reserve forces of the organism (1894), coccidia, and with I. G. Savchenko (1862- ), the rôle of sporozoa in malignant tumors (1892-94).

The leading Russian clinicians of the 19th century were Botkin and Zacharyin.

Sergiei Petrovich **Botkin** (1832-89), son of a Moscow tea-merchant, studied medicine against the grain, having felt a greater inclination for mathematics. Graduating at Moscow in 1855, he served in the Crimean War under Pirogov and was put in charge of the typhus and typhoid wards, since his bad eyesight prevented him from following surgery. After four years study in Europe under Virchow, Traube and Claude Bernard, he was appointed professor of internal medicine at the Military Medical Academy upon his return (1860). He became the foremost consultant in St. Petersburg and was appointed court physician in 1870, but during the last decade of his life, was forbidden the court on account of dubious political activities of which his wife (born Princess Obolinska) was falsely suspected. A diagnosis he made of a mild case of plague in his clinic, when the disease was ravaging the lower reaches of the Volga (1878), set another alarmist storm about Botkin's ears, and although he was sustained by public opinion, he never recovered from the chagrin. He died of angina pectoris at Mentone on Christmas Eve, 1889. In his honor, a barrack hospital and a medical journal were named after him. Botkin was a clinician of the type of Skoda, studying the disease rather than the patient, attaching most importance to a scientific diagnosis confirmed by a postmortem, and tending toward therapeutic nihilism. He gloried in brilliant diagnoses, but in his lectures, displayed a distinct tendency toward general pathology. He loved to elucidate at length his various theories as to the causation of disease, notably the bacterial causation of gallstones, the infectious nature of jaundice (Botkin's disease) and leukæmia. This was characteristic of the St. Petersburg school and of Botkin's pupils, notably Vinogradov at Kazan, who declined to lecture on such a concrete theme as croupous pneumonia, leaving his students to flounder in the clinics as best they could. Botkin was the author of a treatise on clinical medicine (1867-8) which was translated into French and German, of books on fever and heart disease, also translated, and was editor of *Clinical Archives of Internal Medicine* (1875-87). His posthumous writings include "Letters from Bulgaria" (1894), a *Clinique of Internal Medicine* (1899) and *Clinical Lectures* (1899).

Vyacheslav Avksentyevich **Manassein** (1841-1901), Botkin's clinical assistant (1867-9) and best pupil, wrote on inanition (1869), the dimensions

of the red blood corpuscles under different conditions (1872), experimental fever, lectures on general therapy (1879), introduced nutritive enemata, was regarded as an authority on malaria, and was founder and editor of *Vrach* (1880-1901), the leading Russian medical weekly. About this time, the Russian graduating dissertations came to be of value and of these, no less than 120 were turned out by Manassein's pupils, apart from three volumes of *Arbeiten* from his laboratory (1876-9).

Gregory Antonovich **Zacharyin** (1829-1894), Botkin's Moscow rival, based his practice upon clinical observation, as opposed to experiment, both in diagnosis and treatment, with a single eye to getting the patient well. He brought the clinical examination and interrogation of the patient up to a fine art, and some of his feats in diagnosis, such as in floating kidney, gallstones (pain on pressure) and the differentiation of incipient and terminal oedemata in pneumonia (with reference to blood-letting), have become famous. As a therapist, he brought order into the chaos of indications for blood-letting, standardized the use of calomel (1889) and utilized mineral waters with remarkable skill. So successful was he in results, that the French clinician Huchard was sent to Russia in 1888 to study his methods. Zacharyin's *Clinical Lectures* (1889-94) passed through five editions and were translated into German, French and English.

Zacharyin held the chair of clinical medicine in the University of Moscow for thirty-five years (1860-1895) and had the most lucrative consulting practice in all Russia. His clientèle was wealthy, his fees high, and his professional manner with patients brusque, eccentric and exacting. He attended Alexander III in his last illness, and so bitter were his disputes with Leyden and so strange his actions that he was indirectly charged with the Tsar's death. His house was torn down, his furniture burned in the street, he was dropped from the medical societies and resigned his chair although cordially greeted by the students. But Nicholas II forgave him and presented him a diamond snuff box.

Eduard Georg Eduardovich **Eichwald** (1837-89) who entered the Military Medical Academy in 1864 and was driven out of it by Botkin's domineering attitude, was one of the best lecturers on general and specific therapy of his time. His Sunday lectures covered such themes as critical reviews of all lines of treatment and animal magnetism. In 1885, a large fund was left in his name by the Grand Duchess Helena Pavlovna for the construction of a Clinical Institute, now known as the Institute for Post-Graduate Medical Training.

### Of the Russian pediatricists,

Karl **Rauchfuss** (1835-1915), of St. Petersburg, was the leader in the earlier period. He superintended the construction of the Prince Peter of Oldenburg Hospital for Children (1867-9), of which he became director and head physician, and also built the St. Vladimir Children's Hospital in Moscow (1874-6). In 1876 he became pediatricist to the Tsar's family

and made many notable contributions to his subject, notably a history of children's hospitals (1877).

Nils Feodorovich **Filatov** (1847-1902), professor of pediatrics in the Moscow Faculty (1891-1902), was director of the Chludov Children's Hospital (1891), which he made one of the most going pediatric clinics in the world through his engaging lectures. He was the first president of the Moscow Pediatric Society (1892) and author of lectures on infectious diseases of childhood (1885-7), in which he described "fourth disease" as "scarlatiniform rubella" (1887) before Dukes (1900) and Koplik's spots (1895) before Koplik (1898). His Pediatric Semiology is highly esteemed.

Dmitri Alexandrovich **Sokolov** (1861) published a clinic of pleurisy in children (1906) and an instructive album of photographs of sick children (1914). Ivan Vissarovich **Troitsky** (1854- ) has made valuable contributions to the history of pediatrics, of which he has also published a text book (1892-3.) Infantile digestion is considered in the writings of Nikolai Petrovich **Gundobin** (1860-1908) and in the many student dissertations of the Pavlov School.

### In neurology and psychiatry,

Alexiei Jakovlevich **Kozhevnikov** (1836-1902), professor of neurology in the University of Moscow (1884-1902), was the first Russian physician to be called to a chair of this specialty. He opened his clinics and the Kozhevnikov Neurological Museum in 1892, and also had a hand in founding two large lunatic asylums in the city. He wrote on all aspects of his subject and described the mild continuous or partial epilepsy which goes by his name (1893), also lathyrisms (1894). His pupil, Vladimir Karlovich **Roth** (1848- ) of Orel became professor extraordinarius at Moscow in 1894, wrote on glioma of the spinal cord (1887-90), published a large, illustrated work on muscular atrophy (1895) and invented a thermo-aesthesiometer (1889).

Vladimir Michailovich **Bechterev** (1857- ), professor at Kazan (1885) and St. Petersburg (1893), is remarkable for his experimental work on the semicircular canals (1882) and cortical localization of motor functions (1887), his classification of mental diseases (1891), his use of suspension in diseases of the spinal cord (1893), his study of pathways of conduction in the brain and cord (1893), his neurological anatomy (1901) and his many writings on nervous diseases, psychiatry, psychology, suggestion, space-perception and allied subjects. He discovered many unknown bundles and nuclei in the brain and cord, described spinal arthropathy (1892) and noted several unusual symptoms.

Sergiei Sergieyevich **Korsakov** (1853-1900), described the polyneuritic psychosis or alcoholic paraplegia (1887) known as Korsakov's insanity, and wrote the best Russian text book on psychiatry (1893).

Ivan Alexandrovich **Sikorsky** (1845- ) published a notable work on the physiognomy of the insane (1887-93) and Nikolai Nikolayevich

**Bazhenov** (1857- ) a history of the Moscow Madhouse, with many illustrations (1909).

Prominent among the syphilographers and sexologists was Benjamin Michailovich **Tarnovsky** (1837-1906), who wrote on syphilitic aphasia (1870), sexual aberrations (1886), prostitution (1888) and suchlike themes.

The outstanding military surgeons after Pirogov were:

Nikolai Alexandrovich **Velyaminov** (1855- ), who founded the first Russian surgical journal (*Chirurgicheski Vestnik*, 1885), classified diseases of the joints (1908), published a clinique of syphilis of the joints (1910), wrote on thyroid hyperfunction and dysfunction, and theorized on hysteria as an endocrine disorder. He organized the Red Cross during the Russo-Japanese war (1904) and was surgical inspector on the staff of the Grand Duke Nicholas in 1914.

Robert Robertovich **Vreden** (1867- ) was prominent on the staff of the Military Medical Academy and excelled in otology and aural surgery. He described aspergillosis of the tympanic membrane (1867-8), analyzed 80 post-mortem sections of otitis media in the new born (1868), introduced camphor naphthol injections in surgical tuberculosis (1910), discovered the gelatinous substance in the inferior auditory canal and published a field manual of military surgery (1911).

Peter Ivanovich **Dyakonov** (1855-1908) of Orel, participated in the Russo-Turkish War (1877-8) as an orderly, but got into political difficulties while completing his course at the Academy and was assigned to the Orlov Government as territorial physician (1879). Returning in 1883, he became Health Officer of Moscow and the first professor of surgery in the University out of territorial ranks. He initiated the annual congresses of Russian surgeons (1888), published books on the statistics of blindness (1888), death from chloroform (1890), antiseptic wound treatment (1895), and was editor of *Khirurgia* (Moscow, 1897-1908.)

Antisepsis was introduced into Russia (1868) by Paul Petrovich **Pelechin** (1842- ).

Vladimir Dmitrievich **Vladimirov** (1837-1903) introduced the method of osteoplastic resection of the tarsus (1872) afterward perfected by Mikulicz (1881); and Sergiei Petrovich **Kolomnin** (1842-86), the treatment of disease by ignipuncture.

Alexander Alexievich **Bobrov** (1850-1904) introduced an osteoplastic operation for spina bifida (1892) and a method of operative treatment of hydatids of the liver (1896-8).

Nikolai Vassilievich **Sklifosovsky** (1836-1904) was a pioneer in antisepsis, a successful operator in gastrotomy for œsophageal stenosis, ligation of the jugular vein in goitre and inventor of the Russian clamp for suturing bones in the operative treatment of false joints.

The gynaecologist Vladimir Feodorovich **Snegirev** (1847- ) introduced

vaporization of the uterus (1898), and wrote on uterine hæmorrhage (1885), and clinical lectures on diseases of women (1899).

Ovariectomy was first performed in Russia (1862) by Anton Yakovlevich **Krassovski** (1823-98), who had 128 operations to his credit (1884), and published a treatise on operative obstetrics (1885).

Alexiei Andreyevich **Vvedensky** (1856-1900), at Tomsk, worked on such details as lithotripsy in children (1887), calculus in women (1893), and the topography of the female pelvis (1893).

Alexander III (1881-94) was a good-natured man of strong, stocky physique, sluggish disposition and quiet, bourgeois tastes, surrounded by reactionary ministers, such as Pobedonostsev, Plehve and Sipiagin. In consequence, the reform program of Alexander II and Loris Melikov was abandoned and the policies of the reign were conservative and reactionary. Alexander III managed to keep his people out of war, however, and the general stability and tranquility of his reign earned him the just title of "Peace Maker." The main features of his foreign policy were a perceptible turning away from Germany after the Congress of Berlin, a vague *entente* with France and an attempt to Russify Finland and the Baltic Sea Provinces. The unsatisfactory financial situation following the Russo-Turkish war (1877-8) was relieved by a high protective tariff and the standardization of the gold rouble. Development of the factory system gave employment to idle peasants and the construction of the Trans-Siberian and Trans-Caspian Railways encouraged many to take up free land and settle in Siberia and Central Asia. To help out the agrarian crises, the government opened land-banks for peasants and landed proprietors alike.

Where formerly Russian medicine was mainly an offshoot or tributary of Western European medicine, it now began to exert a definite, sometimes decisive effect upon the world at large. Like Von Baer, such expatriates as the Berlin surgeon Ernst von Bergmann (1836- ), Alexander Schmidt (fibrin ferment, 1862), Eliè von Cyon, Oscar Minkowski (pancreatic diabetes, 1889) and Constantin von Monakow (cerebral localization, 1891-2, red nucleus, 1910), were all of them born within the territory

of old Russia and the barriers of language and of distance have been overcome in the case of such important findings as the Eck fistula, the Wedensky effect, the Kernig test or the Stroganov method. The anæsthetic effect of cocaine was noted by Vassili Konstantinovich Anrep (1879-84) before Koller, the "fourth disease" was described by Filatov before Dukes, and Pirogov was almost as forward in the use of ether as the surgeons in the Massachusetts General Hospital. There is a Russian by-word to the effect that Russians are always a few minutes too late. But mere questions of priority dwindle into insignificance before the work of such men as Metchnikov, Pavlov, Haffkine or Besredka, who have been very real benefactors of mankind at large.

**Elie Metchnikov** (1845-1916), son of a spendthrift Russian guardsman and a Jewish mother, was born on his father's estate at Passanovka in the Kharkov Government. In his childhood, he developed a taste for microscopy, which established his bent. As a professional biologist, he was destined to do for the solidist theory of immunity what the chemist Pasteur and the histologist Ehrlich did for its chemical and humoral aspects.

Metchnikov was an enthusiast of high-strung, supersensitive, overweening nature, whose extremist views and tendencies kept him in constant hot water. Graduating at Kharkov, he became professor of zoölogy in the University of Odessa and subsequently director of its Bacteriological Institute, but the disappointments of his life and his disgust with the reactionary tyrannies of his period were such that he could not adjust himself. He twice attempted suicide, once (following the death of his first wife) with an overdose of morphine, and again, when he resigned his Odessa chair, with an auto-inoculation of relapsing fever. On October 15, 1888, he entered the Pasteur Institute where he was to experience such happiness and serenity in the prosecution of scientific research that he became the world's greatest optimist. His discoveries were all of capital importance. His observation of phagocytosis in the larvæ of *Daphnia*,

while in Messina (1884), led to a new view of immunity, to vaccinothrapy and to the doctrine of the reticulo-endo-lethial system, which he mapped out as to locus and function in connection with his studies on inflammation (1892) and immunity (1901). His demonstration that bacteriolysis can take place in *vitro* (1895), that the higher apes can be inoculated with syphilis (1903-4) and that lactic acid can counteract auto-intoxication by changing the bacterial content of the intestine, were equally productive of far-reaching results. His brief for optimism and longevity (1907) is very like Scriabine's belief that the music of the future will possess potencies sufficient for the regeneration of mankind. In the history of Russian science, Metchnikov has only one peer, the great chemist Mendeleyev.

Among the other Russian bacteriologists associated with the Pasteur Institute were:

Nikolai Feodorovich **Gamaleia**, who discovered the bacillus of chicken cholera (1888) and did work on experimental cholera in animals (1899); Waldemar **Haffkine** (1860-93) who was assistant to Pasteur (1889-93) and the great pioneer of preventive inoculation against cholera (1893- ) and bubonic plague (1897-1908) in India; and Alexander **Besredka** (1870- ) of Odessa, who discovered antianaphylaxis or desensitization (1907), introduced sensitized vaccines (1913), preventive inoculation against phthisis by virulent bovine bacillus vaccines (B. C. G. 1921-7) and developed the theory of local solidist immunity within the cells and tissues, without the production or intervention of antibodies (1925).

In Ivan Petrovich **Pavlov** (1849- ) of Ryazan, Russia gained a physiologist who resembles Carl Ludwig in his fatherly capacity to inspire pupils and found a school.<sup>10</sup>

As a lad, Pavlov was athletic, gamesome, ambidextrous and of remarkable tenacity of purpose. At fifteen, he became attracted to physiology by reading G. H. Lewes' book and in 1870, entered the University of St. Petersburg to study medicine under Mendeleyev, Buttlerov and Elie von Cyon, whose assistant he became. Under Cyon's influence he majored in physiology and won a gold medal for his first investigation (with Afanassiev) on the pancreatic nerves. During 1875-9, he passed on to the Military

<sup>10</sup>For this phase, see the interesting biographical sketch in Pavlov's lecture on *Conditioned Reflexes*, New York, 1928, 11-31, by his pupil, Dr. W. H. Gantt, who worked in the Leningrad Laboratory during 1925-8.

Medical Academy and completed his doctor dissertation in 1883. During 1884-6, he worked under Ludwig (Leipzig) and Heidenhain (Breslau). In 1890 he was elected professor of pharmacology in the Military Medical Academy where, in spite of bouts with the despotic director, Paschutin, he remained until 1924. In 1891, the first laboratory of physiological surgery was constructed under his direction in the Oldenburg Institute of Experimental Medicine, of which he had become director (1890). In 1888, Pavlov discovered the secretory nerves of the pancreas, in 1889 the phenomena of "sham feeding" or "psychic secretion" and in 1897, he published his investigations on the digestive glands, for which he received the Nobel Prize (1904). Up to this date, he had encountered virulent opposition on account of the novelty of his findings, which were likened to those of animal trainers. Pavlov's success in experimentation was partly due to his extraordinary skill and ambidexterity in operating on animals, including his method of producing a permanent pancreatic fistula and his use of the Eck fistula (1877). His books on the work of the Digestive Glands (1897), and on Conditioned Reflexes (1926) summarized his own researches.

Apart from these, Pavlov has created a school of Russian physiologists not unlike the pupils of Ludwig and Sir Michael Foster. Many of these have done remarkable work.

Outstanding among the Pavlov pupils are Mme. Schumova Simanovskaia, who assisted him in his method of excluding the stomach to produce a gastric fistula (1889); Chischin, who discovered the effect of different kinds of food upon psychic secretion (1894); Dolinsky, who discovered the effect of irritating the duodenal mucosa with acids in stimulating pancreatic secretion (1895); Chepovalnikov, who discovered the solvent action of pancreatic juice upon proteins when stimulated by intestinal juices or their hormone enterokinase (1899); Volkovich, who discovered the inhibitory effect of fat upon the flow of gastric juice. The graduating dissertations of Russian students on the physiology of digestion make a brilliant showing. Since 1903, Pavlov has worked mainly on the conditional reflexes, and here again his pupils have produced over 200 papers, many of which were written since the war. In 1907, Krasnogorsky discovered conditional reflexes in infants, an experiment which became basic in behaviorist psychology.

Prominent among the later Pavlov pupils are Gleb Vasilievich **Anrep** (1891- ), who has worked in methaemoglobin (1880), antagonism of vasodilator and vasoconstrictor nerves (1894) and the coronary circulation (1927-9); Leon A. **Orbeli** who has demonstrated the effects of sympathetic nerve fibres on skeletal muscle with A. G. **Ginetsinsky** (1922-3) and on the spinal reflexes (1925);



A. D. **Speransky** who has shown the effects of freezing upon the brain and the paths of ingress of antitoxins into it (1928).

In 1916, a *canard* asserting the death of Pavlov gained credence, whence he enjoyed the rare distinction of ascertaining the world's opinion of his merits in many flattering obituary notices. As sometimes happens, however, with a well organized plan of research, his work has been carried on steadily, by himself and pupils, through the period of the Revolution and beyond it.

F. H. GARRISON.

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# THE CONTROL OF CHRONIC DISEASES

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Commissioner of Public Health, State of Massachusetts

*(Hermann Michael Biggs Memorial Lecture, delivered at The New York Academy of Medicine, May 7, 1931.)*

For a health officer to be asked to deliver an address dedicated to the memory of Hermann Biggs is at once a great compliment and a great challenge. What can one of lesser clay say at all worthily in the presence of such a fine professional memory? And yet is there not some hope that a fleeting flicker of his light may be caught and reflected for a moment, though then instantly again lost? The health officer, particularly embarrassed in such presence, reads Lemuel Shattuck's almost prophetic writings of what the public health had in store, much of which is still out of our grasp. But Biggs added to such keen vision the great gift of accomplishment. Surely in the presence of such a memory any health officer must weigh well his audacity and clumsy incompetence.

The growing challenge of chronic disease with all its social, economic and medical implications would have appealed to Dr. Biggs as a problem worthy of his mettle. In fact, Colonel Russell tells me that some twelve years ago Dr. Biggs told him that he had just this problem in mind. For most, it is still unquestionably the province of the private physician, the general hospital and, below the economic dead-line, the public welfare agency. Why should a health officer have any thoughts about chronic disease? Let public health stick to its last of environmental control, communicable disease control, child hygiene, with a little dabbling in maternal hygiene, and mental hygiene if you must, but do leave the rest of acute disease and chronic disease decently for private health. Such thinking (and I

must say I have sympathy with it) is likely to go on and decry the inroads of organized society and government into all privacy today. With the threat of television in the bathroom and loud speakers on airplanes, birth control and more autopsies, requiring statements of why doctors prescribe liquor, and pictures of the mattresses and bedrooms where our socially conspicuous retire, there is little enough that is private from the cradle to the grave. Let health officials stick to their sewage and pesthouses and let us have a little private disease decently and alone.

In spite of all this, consider for a moment whether service to chronic disease is a sound province of government or not, irrespective of whether this province, if it exists, is that of the health officer, the institution director, the department of public welfare, or the board of licensure for cosmetists. For after all to the man in the street it makes little personal difference what department spends his dollar once he has kissed it good-bye. It is the effectiveness of the personnel of the department giving a particular service, rather than the departmental title, that insures reasonable return on investment. But to the general theory of government. In chronic disease, fortunately, there is no need of invoking police power as in communicable disease, polluted water, milk, and the like; so that one need not stand on one's head and whistle through one's ear while vituperating on the protection of the individual against the group and vice versa. (As a matter of fact, the individual rights enthusiast is often the least considerate of his family and his neighbor.) I cannot conceive of any compulsion exerted on anyone to make use of any service offered in the chronic disease field. Of course, a barrage of information as to the proper use of any resources must be laid down, but psychological compulsion has not yet roused the resentment of physical compulsion and the advertising brethren would not tolerate its prohibition.

The question then is whether resources for chronic disease, to be used optionally by the public, should properly be furnished by government irrespective of the economics

of the recipient. (I think there is no serious question but that the paupered chronic should be cared for, but primarily for his pauperism rather than his chronicity.) But what of the non-pauper chronic? Of course, theories of government are as varied as are fat reducing diets and most of them are no more effective. There is the lantern-jawed business man who wants profits without taxation, and who feels that only such "essential" services should be given by government as can not or will not be given by private initiative "effectively." That isn't as good as it sounds. With his private resources this man is likely to have a pretty limited conception of what services are "essential." Then, too, he doesn't state how bad a private service can be before he feels it is not given "effectively," particularly if he be a stockholder.

At the other end of the spectrum is the unhygienic blatherkite who thinks that the only reason soap is manufactured is that it may furnish containers on which he may stand and orate. He has nothing to tax, so let the state furnish everything from soup to nuts, particularly the latter so that he may not feel lonesome! As with everything, the wise theory of government is somewhere between.

But as with any middle course, your opinion and mine as to the exact location of the "middle" depends upon our particular political experience, the degree to which the theory of universal education has failed in our particular case, and whether or not at the moment we have or have not had a good breakfast. Also, where such fluctuants as economics and sociology are concerned, what is paternalism today may be rock-ribbed conservatism tomorrow. Public water supplies in Massachusetts were at first administered by private water companies. Then the "best citizens" probably strained their cardio-vascular systems at the suggestion of governmental encroachment in this field, as they do today at the notion of price fixing of farm produce. Yet now, with ninety-six per cent of our people served by public supplies, we find only a few small private companies persisting and the sooner they are taken over

by the people the better. They are an anachronism! If this profound change in attitude in this particular field has taken place in a few generations, why not in others? With such wide diversity of opinion in a field of such perplexing variables a theory will probably not help us. If the fact is that the people, who get what they want in our form of government if enough of them want it long enough—if our people demand that government serve chronic disease, chronic disease will be so served for better or worse. But should we, who aim to appear thoughtful, aid and abet such a demand if and when it comes, and in what direction should we guide it? That the tree falls cannot be doubted nor long prevented. That it falls where it will, precludes conscious anticipation by the woodsman. To prognosticate future fallings from the heights of private initiative to the depths of organized social effort may be possible by reviewing certain trends.

Not so long ago society was largely sharply stratified. The few had everything and a little more, the many had what was left and liked it. The churches gave certain succor, and an occasional aristocrat with uninhibited inhibitions gave largesse, but these were so unusual that they were made a matter of permanent record. (If the usual were made public record, Mr. Ford would probably think even less of history than he does.) Then democracy swept parts of the world. Social stratification became obscured. Neighbors, for better or worse, became keepers. Social sensitiveness developed and brought with it a sense of community responsibility. Individual social needs were met in an increasingly organized way by the community. The question was no longer whether these were a community responsibility but rather how far and how much. It was a question of extent rather than kind.

In the field of public health the first organized efforts were against the importation of communicable disease. Then bacteriology opened the flood gates of environmental control. Much that is still demanded of health officers in this field is a carry-over from the mentally free and easy

days of spontaneous generation when putrescible organic matter was the cause of all human ills. Randall says that the most permanent thing in man's civilization is ideas and this is evidenced by the persistent public demand that the unæsthetic be controlled in the name of health. But even so, through the control of water, milk, and specific living vectors of disease, great strides have been made. In vast stretches of the world our control knowledge in this field has not been put to work, and there are blind spots where more knowledge is needed. Here resources of government must be concentrated on adding to and applying such knowledge; and expenditures in other more intriguing, perhaps, but less specific fields must be delayed. For us, however, with improved communicable disease resources, particularly where active immunization is possible, the great era of personal hygiene has burst, and anything that bursts is usually not entirely under control, if at all.

Perhaps the greatest efforts in personal hygiene have been directed toward the tuberculous and the children; for the former perhaps because there was nothing specific to offer and tuberculosis was shockingly frequent, and for the latter largely because the young animal rouses the most sentiment. It is perhaps purely fortuitous that the younger the animal the greater the return on the expenditure for its hygiene. There, hygienic efforts have largely been built around detecting as early as possible defects, physical (as teeth, tonsils or posture), habitual (as rest, recreation, nutrition or mental attitudes), or immunological (as a susceptibility to diphtheria or smallpox or other diseases for that matter which our present knowledge gives us no proved effective method of rectifying) and the subsequent correction of these detected defects. Vast sums are being spent in this way and vaster effort and discrimination must be exercised in appraising returns that the expenditures may become more and more specific. In our growing appreciation of the well-being of the child our attention has been given, not too effectively as yet, to the pregnant woman, and it is to be regretted that we can-

not retroact on the grandparents and great-grandparents. Other than that, we have left the adults almost completely alone except for the rather gun-shot advice as to annual visits to their doctors which they have in some numbers made, frequently to their profound disillusionment. Should now the health officer acknowledge as his province the whole field of chronic disease and its control, he would with one sweep include not only all adults (and there are many such physically, though fewer mentally) because of the vast pre-clinical ramification, but also almost the whole field of medicine. But before laughing that off, let us see how the field of medicine has fared over the years.

Up to two or three generations ago the people looked for healing to the priests, the mystics, the fanatics, the senile, and the demented. The entire appeal was to faith. With the advent of science we would replace faith with fact and in the presence of the psychological trauma inseparable from serious disease, fact is a pretty thin substitute. (You may say that this is recognized by psychiatry, but if that is so it seems to be far from any practical large scale application as yet.) All this emotional wateriness of the scientific gruel may, in part, account for the recent articulativeness of the general dissatisfaction with things medical which we hear on every hand. Hardly a self-respecting editor in the country today would dare to offer his paper for serious consideration without at least one medical billingsgate between its covers. Also, this may account for the apparently increasing profit in medical mysticism as dished up by the crystal gazers, the absent treaters, and the back wallopers. (Incidentally we should thank Heaven it is the back they wallop. Just think if the barrage of their attentions were concentrated on the abdomens of the country.) Where we have specific therapy we may perhaps hope that universal education will develop a people that in general will submit, but for all other diseases our doctors must practice the art of medicine and in this they must compete in the open field with the charlatan.

But beyond this, with the widening of our field of knowl-

edge we have, built up a vast array of machinery and special skills and judgments which has enormously diffused the care of the sick and increased its costliness. One black bag, one silk hat, and one pair of whiskers, while enough for eighty per cent or more of the sick, is colossally inadequate for the remainder. This is causing dissatisfaction as to both the quality and price of medical service as generally available and out of an appreciation of this dissatisfaction has sprung the Committee on the Costs of Medical Care which is accumulating relevant data with amazing skill. But also out of this dissatisfaction have come a lot of things more specific than any committee. Whole schemes of medical service by government, industry, labor groups, lodges, colleges, semi-public and private medical groups have been organized on vast or diminutive scales. Some like them and some do not. Some want more and some less. But the multi-varied schemes that have been perpetrated are simplicity itself compared with the glorious projects that we fortunately know not of but hear of almost daily. The most limited intellect feels quite capable of diagnosing the trouble with medical service today and of offering an unequivocal solution. The least fecund of all social groups, as far as suggesting solutions is concerned, is the medical profession as a whole. With a uniformity which suggests self-protection, it urges that as few new schemes as possible be considered, or that no new ones be tried. But with the apparent profound dissatisfaction of the millions of our people with medical things as they are, the plea from the profession that it be left alone is as futile as the caressing of the tide by the broom of the good lady. Change is inevitable. The only questions are, how soon and in what form?

Thus we find that there is no logical limit to the fields into which health departments have gone, or may go. True, even the best are still vastly futile. But our people in general are not nicely sensitive to professional futility. To extend the field would probably increase this futility quotient and result here and there in the well-known ex-



posure. For our people are ruthless to officials when at last their eyes are opened. Also, we find that the whole technique of giving medical service to our people is in a vast flux.

Granted then all the uncertainty, all the danger, and all the public demand, what is the factual basis for our seriously considering organized governmental effort on a large scale in the chronic disease field? With the sharp limitation of immigration and the falling birth and death rates, the average age of our population is increasing year by year. This is particularly marked in the "older" parts of our country; so that in the east the age composition of our people is approximately that of the European countries. Thus yearly we have a larger proportion of our population in the chronic disease age group. In Massachusetts we find that while about 15 per cent of our deaths are from communicable diseases (largely tuberculosis and pneumonia) over 60 per cent are from chronic disease. In two generations the average age at time of death has risen from 31 to 51. Yet during this time the average time of death for those over fifty has *decreased* a fraction of a year. Actually decreased! We find, also, that the average duration of disease prior to death has increased nearly four times in twenty years. That, of course, means more chronic and less acute deaths. Consider what that means in terms of costs for terminal hospitalization! We find chronic diseases appearing more and more prominently among the principal causes of death. This means that more and more of our people are experiencing in themselves or their relatives and friends personal suffering from chronic disease.

But deaths do not tell the whole story. They are more dramatic and more easily available than figures as to cases. But cases give a truer picture. Since the legislature ordered a cancer program some five years ago we have been collecting data on chronic disease morbidity from a representative sample of some 70,000 people. They show astonishing things. Eleven per cent of our total population,

and over one-quarter of those over fifty admit chronic disease. Nearly half a million people in Massachusetts are sick with chronic disease at any one time. While in the death columns heart leads (10,000), then cancer (5,000), and third, pneumonia (about 5,000), the morbidity figures show first rheumatism (145,000), second, heart disease (89,000), third, arteriosclerosis (56,000), fourth, nephritis (31,000), and fifth, cancer (10,000). Of these cases, 8.2 per cent, or one in every 109 persons, are completely disabled from chronic disease. Over one-third of all the chronically sick individuals, and two-thirds of the rheumatics, were receiving no treatment. Contrast this with the fact that in well-ordered arthritic clinics over two-thirds can be benefited. Also consider that in Massachusetts alone \$8,000,000 in wages alone are lost annually on account of rheumatism. Yet two-thirds untreated, while two-thirds could be benefited with many more cured or prevented. Then as to duration, the untreated case of cancer averages two years, heart disease over nine years, and rheumatism over twelve years. Rheumatism cripples but does not kill! Hence its economic significance and its neglect. Surely with these facts no one can stop something being done for rheumatism. But what?

Then look at heart disease! Rheumatic heart disease in children! Every clinic is crying for beds where the little ones may receive the needed continued treatment to prevent extension of damage. In most of our cities beds for tonsillectomy are engaged ahead as eagerly as seats for the first night of the opera. Now the children with rheumatic heart disease go in and out of our general hospitals tragically and futilely. Investigations are under way and are cryingly needed. What is the relation of this infection in children to adult heart disease and rheumatism? How ominous the growing menace of heart disease, particularly in the medical profession! It has been said that a campaign for the control of heart disease among doctors should be instituted, since their rate is particularly high. Is this civilization a Frankenstein monster that will

destroy us through our cardio-vascular and synovial systems? But again, what to do?

In Massachusetts under a legislative mandate we have developed a cancer program. In a hospital of 115 beds with complete physical equipment, competent resident staff and a superlative visiting staff giving about three hundred hours per month, we are serving 1,000 patients a year, besides those handled in the weekly clinic. Practically all the hospitals that were serving cancer before are now finding a greater demand than ever, which would seem to demonstrate again that once the confidence of the public has been aroused the demand is practically incalculable.

In fifteen cities and towns state-aided clinics have been developed under the direction of committees appointed by the local medical societies. These serve over two thousand people a year of whom over five hundred have cancer. The proportion coming to these clinics from doctors has risen from 25 per cent to 36 per cent. The newspapers at first brought in two-thirds, but now only one-third of the patients. Our cancer program is less "news" as time goes on. Following a state-wide campaign we circularized all doctors and found that for every patient coming to a clinic there were 22 going to the private office and that there were more seeking private service in cities where there were clinics than where there were not. We are frantically striving for objective estimates of results. After two years we find that 15 per cent more of the cancers seen in the clinics in 1928 are still alive, than of those seen in 1927. The time is too short and the figures are too small and too crude, but as time goes on we will get something more valuable, because we are collecting data on morbidity such as was not previously available.

Education, or more properly, propaganda has gone on in alarming volume; all aimed to motivate the person with the persistent abnormality to seek competent medical advice promptly. The periodic physical examination, of

course, plays right into the hands of those interested in the earlier and earlier detection of any of the chronic diseases.

Under this program then we have set up resources against cancer that are being extensively used, and in an increasing amount by the private physician as adjuncts to the service which he can give. In private offices, clinics and hospitals we estimate in the last three years that over 80 per cent of the cancer in the state has been served. How early and how well it is yet premature to state. Yet there are a few indications which would seem to warrant slight optimism.

Is this then a crude pattern that might be somewhat followed in developing service to other chronic disease? Should we look to government setting up in clinics and hospitals the expensive equipment and special skill needed for the diagnosis, cure and alleviation of more and more of these diseases as the one antidote to the tidal wave of terminal hospitalization which may otherwise swamp us? May we hope that as the quality of these services is demonstrated the private physician will more and more utilize them selectively? So, perhaps, out of this, the indictment of official and professional indifference will be met, and we may be saved from the qualitative atrophy of complete medical socialization.

But if communities that are on the road to solving their environmental and communicable disease problems do take up the burden of organized efforts against chronic disease, shall this be assigned to the health department? Except for education as to whatever prevention our present knowledge may allow, for further education as to early signs and symptoms and perhaps for organized resources for early recognition, it is a problem of disease rather than health. Such a distinction is of more than academic importance since in the welter of the sick and the well the sick are likely to receive the maximum of attention because of the humanities, to the detriment of the primary responsibility of the health department.

In conclusion then, the growing burden of chronic disease will, as time goes on, demand organized governmental resources. These, it may well be decided to put under health departments. If so, meticulous care must be exercised that in the intricate diversities of adequate diagnostic and therapeutic service to the sick the cardinal responsibility of our health departments shall not be lost sight of—that of keeping the well well.

# TROPICAL DISEASES AND PARASITIC INFECTIONS IN NEW YORK CITY\*

F. W. O'CONNOR, M.R.C.S.

In view of expressed opinions regarding the prevalence or otherwise of tropical diseases in New York City, some preliminary observations have recently been made. As a result it appears that such infections and others due to animal parasites are abundant in this city.

## SOURCES OF MATERIAL

1. First in importance is the considerable number of residents who were born abroad, especially in the tropics. The Welfare Council of New York City conducts its work on an approximate estimate of 150,000 persons from Porto Rico alone. The Chinese population of the city numbers over 10,000. The Philippine population, principally in the Bronx, exceeds 5,000. Our own experience at the Presbyterian Hospital indicates that the population of persons from islands in the Caribbean other than Porto Rico and from Central and South America is also considerable.

2. Emigrants from Europe especially from the southern and eastern parts of the Continent furnish many cases of parasitic infections.

3. The foreign mission boards of the United States send more workers to the tropics than any similar organizations of other countries. The personnel of the Presbyterian, Methodist and Baptist Boards, including men, women and children totals 6,856 persons. Many of these pass through New York, where, through the coöperation of the various mission boards, it is possible to study their infections.

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\*Read before the Section of Medicine, March 17, 1931.

4. In the United States itself there is a rich field of animal parasitism amongst the human population; this is especially true amongst the residents from the Southern States.

5. Up to date we have no definite figures of the number of sailors born in the tropics who visit our port, but a rough estimate shows that ninety-two steamship companies trading in the tropics have ships which arrive at New York and part of the crews of many of these were born in warm countries.

6. American commercial enterprises in the tropics have been increasing in number and scope for some years with a corresponding increase in the incidence of tropical disease amongst their employees. Similarly, there has been a growing number of cases of parasitism amongst scientific workers from this to tropical countries especially geologists, archeologists, explorers and the personnel of expeditions sent out by the various museums and universities.

7. Finally, as foreign travel grows more popular amongst the people of the United States it is not surprising that many cases come from those of this group whose interest takes them to warm countries.

The following figures from a very few institutions give some impression of the amount of material available in the city. Major E. C. Martindale, Director of the Department of Pathology at the U. S. Marine Hospital, in his annual report of laboratory studies shows that during 1930 two hundred blood films from cases of suspected malaria were sent to his laboratory, in sixty of which malarial parasites were found. At this institution also during the past seven years seven cases of granuloma inguinale were seen.

The figures for tropical diseases at the Long Island College Hospital for the years 1925-1929 are as follows:

Malaria .....	99
Amoebic dysentery .....	8
Kala-azar .....	3

Bilharzia .....	1
Actinomycosis .....	2
Granuloma inguinale .....	5
Filaria .....	1
Hookworm .....	1
Leprosy .....	5
Beri-beri .....	1

Dr. C. H. Lavinder reports as follows from the hospitals at Ellis Island and Staten Island for a five year period:

Malaria .....	420
Amoebiasis .....	40
Amoebic liver abscess .....	8
Leprosy .....	5
Beri-beri .....	2
Filariasis .....	2
Coccidiosis .....	1
Sprue .....	1
Pellagra .....	1

Captain Thomas of the U. S. Naval Hospital in Brooklyn reports the following for 1930:

Malaria .....	20
Amoebic liver abscess .....	2
Amoebic dysentery .....	5
Hookworm .....	3
Trichuris trichiura .....	3
Schistosoma japonicum .....	1

In the course of our own studies during a period of eighteen months the following have been observed:

#### *Protozoal Infections.*

Amoebiasis due to *Entamoeba histolytica* in all its clinical manifestations including liver abscess. Infections with all the known protozoa with the exception of coccidiosis. Malaria in all its three forms with mixed infections of these plasmodia.

#### *African Trypanosomiasis.*

#### *Helminthic Infections.*

a. Nematodes: *Ascaris*, Hookworm, *Enterobius*, Trichiniasis, Trichuris, Creeping Eruption, *Loa loa*, *Acanthocheilonema perstans* and every clinical manifestation of *Filaria bancrofti*.

b. Tapeworms: *T. echinococcus*, *T. saginata*, *T. solium*, *Hymenolepis nana* and *Diphyllobothrium latum*.



c. Trematodes: *Schistosoma mansoni*, *Clonorchis sinensis*, *Paragonimus westermani* and *Fasciolopsis buski*.

*Bacterial Conditions Considered Tropical*: Undulant Fever, Leprosy and Bacillary Dysentery.

*Vitamin Deficiency Diseases*: Pellagra and Beri-beri.

*Diseases of Undetermined Etiology*: Blackwater Fever, Yellow Fever, Typhus, Granuloma inguinale, Ainhum, Sprue and Climatic Bubo.

*Skin Diseases*: Dhobie Itch, Pinta, Madura Foot and Actinomycosis.

Amongst the foregoing the following have been the most prevalent:

Clinical amoebiasis (confirmed by microscopical examination) .....	66
Amoebic liver abscess .....	6
Hookworm .....	48
Filariasis (including 5 cases of chyluria) .....	60
Malaria .....	30
Sprue .....	6
Tapeworms .....	50

Considering that the above represent only a few of the medical institutes it will be readily appreciated that there is ample material for clinical studies and research in tropical disease and conditions due to animal parasites in New York City.

For the efficient study of tropical disease and its ultimate aim, prevention, it should be noted that other facilities are available. The high efficiency of the Public and Port Health Services suggest important possibilities for the study of marine hygiene and quarantine methods through coöperation with these organizations. For those interested in the study of comparative pathology and parasitology, the valuable collection at the Bronx Zoological Park, offers great opportunities. In connection with field studies so very necessary in tropical medicine New York is in a very strategic position. A night or two on the train will place one in our own South, which is rich in opportunities for the study of hookworm, ascaris infection, malaria, pellagra and leprosy, while in three to four days he can be in Porto Rico actively engaged in an even more varied field of disease.

## EFFECT OF AIR POLLUTION ON HEALTH

### REPORT OF THE COMMITTEE ON PUBLIC HEALTH RELATIONS OF THE NEW YORK ACADEMY OF MEDICINE.

This report on the effect of air pollution on health is the outcome of a request made to the New York Academy of Medicine by Doctor Shirley W. Wynne, Commissioner of Health of New York City, asking that a committee be formed to study and report on the effect of air pollution on health. The report and conclusions are based upon a careful study of the literature of air pollution and its effect upon health; on correspondence and conferences with physicians and engineers (authorities on air pollution), and finally on the opinions of the members of the committee.

Since a bibliography of smoke and smoke prevention, collected by Elwood H. McClelland, has been published by the University of Pittsburgh, only a few references to the literature are included in this brief report.

#### *Introduction.*

Although the nuisance of smoke is present wherever fuel, rubbish, and gasoline are burned; although everyone abhors smoke, and 25 cities in the United States of more than 30,000 inhabitants have smoke ordinances, these ordinances are not strictly enforced because public opinion has not been sufficiently aroused to demand their enforcement. It was almost a hundred years after Ramazzini published his book on the effect of smoke on health before Laennec and others insisted on the importance of air pollution. The world is indebted to Traube for proving in 1860 that carbon in the air left its traces in the lungs, pleura, and glands of those who breathe such air.

The Mellon Institute of Industrial Research in Pitts-

burgh, under the able direction of H. B. Meller, instituted researches on air pollution in 1912. It is encouraging that similar work is now being carried on in several institutions and with the awakening of public interest and the support of scientific data proving the danger to health and the damage to property caused by air pollution, great improvement will soon be noticed in many cities of the United States.

## OUTLINE OF AIR POLLUTION PROBLEM

### *Composition of Smoke and Soot.*

Smoke is composed of soot (solid carbon particles resulting from incomplete combustion) and certain volatile gases—sulphuric oxid, carbon monoxid, carbon dioxid, sodium chloride, sulphuric acid, and nitrogen, sulphur, and arsenic compounds.

### *Sources of Smoke and Soot.*

Locomotives, chimneys, boats and automobiles are the chief sources of smoke. A committee of the Academy of Medicine has studied and reported on carbon monoxid poisoning and the automobile exhaust (Carbon Monoxid Poisoning and the Automobile Exhaust, *Bull. N. Y. A. M.*, Aug., 1926, pp. 402-440).

### *Instruments for Investigations.*

Several instruments and methods for determining the amount and type of air pollution are available.

### *Results of Investigation of Smoke.*

An investigation conducted by the Mellon Institute of Pittsburgh in 1924 found the average deposit from smoke in that city to be 89.7 tons per square mile in one month. Records of the Weather Bureau in New York City for 1930 show that the deposit averaged 3.97 tons per square mile per month.

In Pittsburgh the amount of tar has decreased materially since 1913 while the combustibles other than tar and

ash have increased. The increase in solid matter deposited is due partly to an increase in the number of stacks, but principally to the fact that legislation has attempted to control only dense smoke which is possibly not as serious a menace to health as transparent poisonous smoke. It is hoped that further investigations of the poisonous effects of smoke may be made in New York City.

### SUBSTANCES WHICH POLLUTE THE AIR

1. *Sulphur*. Sulphur is present in smoke in the form of  $\text{SO}_2$  (sulphur dioxide) and  $\text{H}_2\text{SO}_4$  (sulphuric acid). It has been estimated that in London almost 50 tons of sulphur are poured into the air each day. In Glasgow and Manchester, it is stated, 20 tons escape each day in the smoke. According to Rideal, the quantity of sulphur present in the air of London, from different analyses, is from 0.15-0.77 grams per 100 cubic feet. At Kew, as much as 2% of sulphur was found in an analysis of dust from an exposed surface. According to Nicholson, one-half cwt. of sulphuric acid is deposited over every square mile of Manchester, and in Chelsea much more is deposited.

It is probable that sulphurous fumes are the most deadly of all the gaseous constituents of smoke. In this connection Evans states: "Sulphur compounds are very objectionable and probably more harmful than carbon compounds. Probably before long our dense smoke ordinances will be changed so as to add to the carbon control other provisions which will control sulphur compounds. Possibly, also, the combustion experiments will likewise be directed more to the solution of the sulphur problem."

Schaefer, who has made a special study of the effects of sulphur gases on health, attributes lasting and serious results to the inhalation of these gases. Sulphur fumes, he believes, play a large rôle in the etiology of asthma.

Ascher has cited experimental work done by Kimball on rabbits which demonstrated the fact that, by causing rabbits to breathe small quantities of sulphuric acid fumes the

number of tuberculous infections were increased. He also states that other experimental work has shown that sulphur inhalation causes a decrease in the bactericidal action in tuberculous lungs and a lowering of the power of resistance.

2. *Arsenic.* Most varieties of coal contain small quantities of arsenic. According to Cohen and Ruston arsenic found in air and water is derived from coal smoke.

3. *Carbon monoxid.* Carbon monoxid is a product of combustion. The smoke from iron furnaces contains from 25% to 35% of this gas.

Liesegang (*Klin. Woch.*, 1928, v. 7, pp. 463-5) regards the presence of carbon monoxid in the atmosphere as having a pronounced effect on city dwellers. He cites the estimate of a daily total of 124,000 cubic meters of carbon monoxid produced by motor cars in the city of Berlin. Studies in 1926 estimated that motor vehicles at 42nd Street and Fifth Avenue in New York City discharged 30,000 cubic feet of carbon monoxid in a day.

The present percentage (from 7 to 14 per cent) of carbon monoxid in automobile exhaust gases is unnecessarily high. A high content of this gas represents a heavy sacrifice of miles per gallon for the sake of power and ease in starting a cold motor. Ample power may be had from any machine from a CO content of but 3 per cent by volume of the exhaust gases, and the present average content of over 7 per cent is wasteful.

Kinnicut and Sanford state that "air containing 0.3% of carbon monoxid causes death, 0.2% very dangerous symptoms, and that mice will quickly show the effects of the gas when the air contains only 0.005%. It produces headache, vertigo, malaise, muscular weakness, nausea, and vomiting and finally drowsiness, loss of consciousness, and death. Continued breathing of carbon monoxid gas causes severe anemia and its sequelæ."

Human blood has such an affinity for carbon monoxid

that it is taken into the circulation when the atmosphere contains no more than .004% or 1/25,000 part (Fodor). The fatal effects often produced by this gas are due to the fact that hemoglobin has an affinity for carbon monoxid and the compound formed—carboxyhemoglobin—is much more stable than oxyhemoglobin. If any considerable quantity of carbon monoxid is present in the air the hemoglobin will be almost completely charged with carboxyhemoglobin and asphyxia will result (Haliburton).

The studies for the Public Health Committee of the New York Academy of Medicine by Professor Yandell Henderson show that under certain atmospheric conditions, when little breeze is stirring and traffic is heavy, the carbon monoxid content of the street air in New York City reaches a point where prolonged and continuous exposure to it may have deleterious effects.

*Carbon dioxid.* According to Tobold, carbon dioxid in a proportion of 1:10 acts as a poison causing headache and shortness of breath; 30% may cause death. Schaffer states that in London 100,000 tons of carbon dioxid are poured into the air as smoke each day. Coullard believes that a smoky atmosphere is poisonous because of the large quantity of carbon dioxid rather than because of a deficiency of oxygen.

Renk says, "Normal air contains about .03% while city air contains .03% to .05%. This is not sufficient to prove a menace to health, yet small amounts of excess carbon dioxid inhaled for long periods of time would, within limits, tend to have the effects somewhat similar to those produced by large amounts breathed for a short period of time"—namely, accumulation of carbon dioxid in the blood, abatement of oxidation within the organs, lowering of body temperature, loss of reflex transmission to the limbs, to the eyes, and finally paralysis of the respiratory center and death.

4. *Chlorine and Nitrogen Gases.* These gases probably play a minor rôle in the effect of smoke upon health. They

occur mainly in the smoke of industrial centers. Coullard believes that chlorine fumes, while slightly vitiating, do not cause serious disorders except through prolonged inhalation in which case they might light up a tuberculous process.

Nitrogen vapors act, according to Coullard, "(1) by powerfully irritating the bronchi and the small pulmonary vessels to the point of producing centers of apoplexy and (2) by producing a special impoverishment of the blood."

#### INSTRUMENTS AND METHODS FOR INVESTIGATING AIR POLLUTION.

*Capnometer.* From the beginning of the Mellon Institute's Air Pollution Investigation (L. W. Bass, *Science*, 70: 186, August 23, 1929), it was recognized that the photo-electric cell would play an important part in the determination of the amount of atmospheric contamination and its distribution outward and upward from sources. Sampling devices ordinarily enable one to estimate the content of solids in a small volume of air at a given time and place, or the total amount at a given place over a period of time. It was desirable, however, to have a continuous record, not only of the amount of pollution, but also of the effects of atmospheric conditions upon the distribution of solids after their emission from stacks or other sources.

With the helpful coöperation of members of the staff of the Westinghouse Research Laboratories, experiments were made first for work at short range, and in consequence a combination has been developed that may be used at night or in the daytime. It consists essentially of a source of light with a modulator, a receiver and amplifier, tuned, and an indicator or recorder, calibrated. It differs from "smoke indicators" in that it need not be attached to a smokepipe or stack and also in that it operates independently of any influence from daylight or artificial light other than that from the controlled source.

At the suggestion of W. A. Hamor, Assistant Director,

Mellon Institute, the apparatus has been named the capnometer (Greek *kapnos*, smoke, and *metron*, measure), for its purpose is to measure smoke—capnometry.

From the results of the work done in the laboratory the apparatus should be very helpful in securing data concerning the influence of furnace and firing conditions, precipitation, wind velocities, etc., upon the density due to pollution of the atmosphere. (From *Science*, March 28, 1930, vol. 71, No. 1839, pages 344-345).

*Soot Fall Survey.* Samples for this purpose are collected in jars or cans approximately four inches in diameter by ten inches high. These vessels are placed at various stations and changed monthly. The containers are cleansed and a small volume of distilled water is poured in to avoid loss of precipitate through the action of wind. Samples are analyzed to determine percentages of tar, and combustibles other than tar and ash.

#### *Determination of Intensity of Daylight.*

This can be determined by its effect in decomposing oxalic acid. Meller reports:

In 1912-1913 in Pittsburgh the intensity of daylight was determined by its effect in decomposing oxalic acid, thus: (a) This decomposition, on days when the presence of smoke or fog was recorded, was 75 per cent of what it was on days having practically the same number of hours of sunshine without the presence of fog or smoke in appreciable quantities. (b) A decrease of 39 per cent in the limit of visibility was accompanied by a decrease of 24 per cent in the decomposition of oxalic acid. (c) In the absence of smoke and fog there seemed to be little connection between the percentage of decomposition of oxalic acid and the limit of visibility. (d) There was an increase of acid decomposition with increase in the hours of sunshine.

#### *Screening Effect of Soot.*

The accumulation of soot on skylights when exposed for a certain time interferes with the transmission of light. This

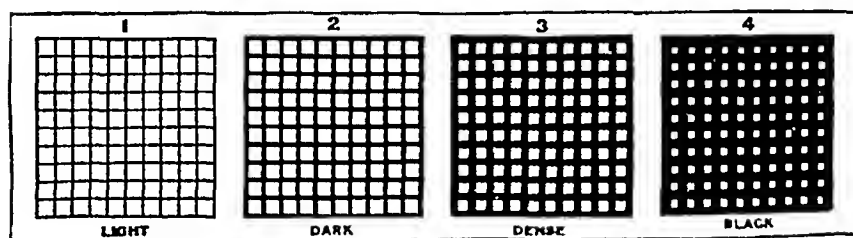


loss of light can be measured photometrically. In the smoky zone in Pittsburgh this was 80 per cent compared with about 40 per cent in one of the less smoky suburbs.

*Measurement of Solar Radiations.* This can be determined by an instrument called a spectograph. The spectograph is used for standardizing other instruments and for taking photographs of the solar spectrum.

*Solid Matter in Suspension.* This is sampled by the Owens Jet Dust Counter. The solid particles are precipitated on glass and the glass is then mounted on a slide for microscopic study. The number of particles are counted and the sizes are measured.

*Density of Smoke.* The density of smoke is measured by the Ringlemann Chart.



#### THE RINGLEMANN CHART USED IN PITTSBURGH

Place the chart on a line with a stack a sufficient distance from the eye to cause the lines to merge. Compare with the density of smoke under observation; if equal to or greater than 3, the smoke is a violation of the city ordinance and the operator is liable to penalty.

(Reprinted by permission from the May 1930 issue, *Scientific American*)

*Determination of Carbon Monoxid.* Carbon monoxid gas in the atmosphere is determined by the use of iodine pentoxid.

#### EFFECTS OF AIR POLLUTION ON GENERAL HEALTH

The Chief Medical Officer of the Ministry of Health of England, in his annual report on the state of the public health for the year 1927, writes:

"The recognition of the dependency of health on sunlight

is part of the inherited experience of mankind and does not call for mathematical demonstration. We are, however, now gaining more exact knowledge of the nature of this relationship and the conditions which influence it. The beneficial effects of exposure to the sun's rays have been demonstrated, for example, in such diseases as surgical tuberculosis and rickets, and the result is seen not only in the direct effect on the obvious disease, but in a general stimulation of body growth. The importance of sunlight to healthy growth is increasingly realized and the rearing of healthy children requires that they should not be deprived of what is so essential to their well-being."

Sunshine is an important biodynamic agent. It promotes anabolism, transpiration, and respiration, and increases the percentage of hemoglobin. The blue and ultraviolet rays of sunshine exert a bactericidal effect on pathogenic bacteria, and a tonic, vitalizing influence on the feelings. Moreover, colorless daylight is superior for visual efficiency and eye health.

Dark clouds have a depressing, devitalizing effect.

Humidity increases the solid, poisonous, bacterial contents of the air, aggravates various pathological conditions of the body, reduces the sensitivity of some sense organs, and depletes the vital potential. Fogs, in addition, increase the inaccuracy of mental work, the prevalence of diseases, and augment the death rate.

Clear, dry days are anabolic in character and thus produce a superabundance of energy.

Liefman concludes that darkening of the atmosphere of our cities is injurious to health in three ways: (1) An exciting impulse which influences our disposition is weakened and the energy of metabolism, especially as it concerns respiration, is diminished. (2) The illumination and warming of the earth, the water and the air within the precincts of our great cities is diminished and in this way a series of hygienically important processes is in-

fluenced or depressed. (3) The chemical and bactericidal effect of the sun's rays is decreased and thus bacteria, especially the pathogenic ones, are permitted to thrive. (*Mellon Inst. Bull.*, No. 9.)

According to Sir William Ramsay, "Smoke is harmful by its power to absorb light directly and by its effect in the formation of clouds and fogs which are peculiarly fitted to absorb the blue, the violet and ultra-violet rays, these being the rays that are especially germicidal. Diminution of sunshine causes an increase of bacteria in the atmosphere." He also believes that sunshine has a direct influence on the human skin as well as upon the mental state.

#### VISION AND ILLUMINATION AND ULTRA-VIOLET RAYS

Cutting off sunshine and sky-shine (clouds reflect light) makes it necessary to use artificial light with its detrimental effect on vision.

Smoke acts as a curtain and cuts off the sun's direct rays, ultra-violet rays which are necessary for the healthy development not only of plants but of human beings. Rickets, anemia, and tuberculosis are likely to develop in children who are deprived of sunlight.

Doctor Henry F. Vaughan and Doctor Meader report that their "studies on sunlight have indicated that the rays at Northville, about twenty-five miles from the center of Detroit, contain about four times as much ultra-violet as do the rays in the city. This is apparently due to smoke."

Sir John Robertson, C.M.G., Medical Officer of Health, Birmingham, in his Annual Report for 1926, dealt at length with the smoke nuisance and its effects, and said that the extent to which the products of combustion are in the air of any large city has three chief influences on the inhabitants of the district: "It is prejudicial to health, it causes a great deal of unnecessary labour and cleansing, and it limits the growth of many plants, and, therefore, hinders what is beautiful or useful in town gardens."

By far the most important of these, he considers, is the fact that all smoke or dust in the air shuts out, in direct proportion to its amount, the ultra-violet rays, and prevents them from reaching the dwellers in the area. "The absence of these rays for the greater part of the day lowers vitality, and by so doing renders most people susceptible to ailments which they themselves would not associate with the absence of sunlight."

"This deleterious effect," his report continues, "is for the most part produced by the very light and minute particles of soot which are carried high up in the air, and form by their presence an effective barrier to the sun's rays. It is possible to demonstrate this even when with unaided eyes the sun looks clear over the city."

McCollum of Johns Hopkins has shown that the growth-producing factor, Vitamin A, and the anti-rachitic factor in cod liver oil are not the same and the latter has been designated Vitamin D. In the earliest experiments it was found that the effect was produced by irradiating the animal, and it was supposed that in irradiating it, the cholesterol of the skin was activated in such a way that on absorption it so affected the lining membrane of the gut that the phosphorus and calcium became easily assimilable. This assumption was almost true. But it has since been proved that it is a substance always associated with the cholesterol which can be activated, viz., ergosterol, and it is this substance which, in various forms and under many names is now added to all the anti-rachitic proprietary preparations prominent in the medical market today.

Rickets is generally considered a disease of childhood and its far-reaching effects are often forgotten. Gynecologists dread the difficult labor of the woman deformed by rickets. The pelvic outlet is small. Spontaneous delivery is impossible. Instruments are necessary. There is danger of the soft parts being torn and sepsis supervening. Some believe that when this disease is wiped out there will be a coincident reduction in the puerperal fever rates.

The loss of light due to smoke in New York City is the subject of a recent report by the United States Public Health Service (*Public Health Bulletin*, No. 197). The results of this study may be briefly summarized as follows:

Records of the total horizontal illumination were obtained throughout the year 1927 with photo-electric cells and recording potentiometers simultaneously at the Hudson Street Marine Hospital, at the lower end of Manhattan Island, N. Y., where the air was very smoky, and on Hoffman Island, in lower New York Bay, about nine miles farther south, where the air was comparatively free from smoke.

From these records the average hourly horizontal illumination has been calculated for each of these two places for each month of the year. The daily average for each month and the hourly average for the year have also been calculated for each place. Both the absolute and the relative loss of light from smoke at the Hudson Street Hospital have been determined from the records.

The highest average daily horizontal illumination at Hoffman Island occurred in June and the lowest in December. The greatest total loss of light at the Hudson Street Hospital was in July and the least in December.

The records showed a large relative loss of light due to smoke. In some cases the average hourly or daily percentage loss was greater than 50 per cent. The average percentage loss for the whole year was 16.6 for clear days, 34.6 for cloudy days, and 21.5 for all days. The percentage loss on cloudy days was therefore about twice as great as on clear days.

An analysis of the results shows that the loss of light depends, among other things, upon the altitude of the sun, upon the nature of the daylight, whether from a clear or cloudy sky, upon the relative humidity of the air, and upon the velocity of the wind.

The effect of the altitude of the sun upon the percentage

loss of light is shown clearly in the variation of the percentage loss with the hour of the day. The average percentage loss throughout the year was 30.2 at 8:30 a. m., 16.5 at 1:30 p. m., and 21.0 at 3:30 p. m.

The average monthly percentage losses showed no marked seasonal variation, but did show a marked relation to the average monthly relative humidities, the percentage losses usually increasing and decreasing with the relative humidities. For clear days the greatest average monthly percentage loss was 23.1 in November and the least was 12.1 in May, with corresponding average relative humidities of 64.6 and 39.0 per cent. For cloudy days these values were 52.7 in September and 23.6 in December, with corresponding average relative humidities of 99.4 and 85.9 per cent.

Other conditions being the same, the average percentage loss of light was greater for cloudy days, or cloudy hours, than for clear days or clear hours; the percentage loss being about 1.5 times as great for cloudy days as for clear days, for relative humidities between 40 and 80 per cent, and for wind velocities between 10.0 and 19.9 miles per hour.

For the same kind of sky, clear or cloudy, the average percentage loss of light increased with increase of relative humidity. For a clear sky the average percentage loss was twice as great for a relative humidity of 65 per cent as for 35 per cent. For a cloudy sky the increase was not as great.

Other conditions being the same, the percentage loss of light was found to decrease as the velocity of the wind increased.

The percentage loss of light was found to be largely independent of the pressure of the water vapor in the atmosphere and therefore of the absolute humidity.

## RESPIRATORY DISEASES

The inhalation of carbon particles, irritating fumes, and other atmospheric impurities irritate the mucous membrane of the nose and lower its resistance, thus rendering it liable to acute and chronic infections which may involve the ear. Irritation alone can produce congestion of the mucous membrane, secondary swelling of the turbinates, and vacuum frontal sinus headaches. Patients in whom the membranes are diseased and the ciliated epithelium destroyed have great difficulty in eliminating the irritating particles and are therefore more sensitive to atmospheric pollution. In addition to this there is no doubt that some patients can be sensitized to certain forms of air pollution with the usual allergic manifestations. According to Doctor Henning of Leipzig, enlargement of the tonsils is common in firemen because of the irritating effects of smoke. Redness and congestion of the pharynx and larynx and tendency to inflammation of these tissues are predisposed to by atmospheric pollution.

*Effect of Air Pollution on the Lungs.* Doctor H. Osborne (*Medical Officer*, 1928) says, "During periods of winter fog owing to certain barometric conditions and absence of wind, smoke cannot get away but accumulates in the lower air strata. As a consequence the proportion of impurity is enormously increased and the concentration of sulphuric acid in the air may be such as to cause irritation of the eyes, nose, and respiratory passages. It is a common experience of local medical practitioners to find their bronchitis patients dying in numbers during prolonged periods of winter fog." He concludes as follows: "I would like to invite attention to a very striking correlation which emerges from a comparison of health statistics for the year 1926 with previous years. The general death rate for the year (12.5 per 1,000 living) is the lowest ever recorded for Salford. The greatest reduction of mortality occurred in the great group of respiratory diseases and this fact associated with the occurrence of the prolonged coal dispute

and consequent relative purity of our atmosphere, is a matter of some significance."

H. K. Kugel, Acting Commissioner of Smoke Inspection, Cleveland, writes that the survey made by the Mellon Institute several years ago in Pittsburgh seemed to show that in certain parts of the city which were the smokiest, diseases of the respiratory tract were much more numerous. A similar survey was made a short time ago in Akron and apparently shows the same trend.

It is interesting to note that the annual death rate from pneumonia is greater than from all other infectious diseases combined. Smoke irritates the mucous membrane and predisposes to diseases of the respiratory tract, especially pneumonia.

Professor Sir Leonard Hill, M.B., F.R.S., in a lecture delivered at the Medical Officers of Health Conference, at Newcastle-on-Tyne, in June, 1929, said: "Respiratory diseases now cause 40 per cent to 50 per cent of the lost time in workshops and offices and produce a vast amount of lessened efficiency and suffering."

Taylor says, as a result of inhaling about 35 lbs. of air daily, dwellers in the industrial cities have lungs more or less similar to those of the coal miner, not pinkish in color like those of a child or one who tills the field, but blackened, both on the surface and in the depths, due to the deposit of carbon. The tarry matter and the less visible sulphur acids which are far more dangerous than the carbon, set up an irritation in the mucous lining of the windpipe and smaller tubes. Chronic catarrh supervenes. The mucous lining becomes rough and thickened, the surrounding tissues lose their elasticity and become leathery in texture. These changes produce symptoms of chronic bronchitis, symptoms resulting from persistent irritation, partial collapse of the lungs, and incomplete oxygenation of the blood.

Dr. W. A. Brend has examined the main factors which



might be held to account for a high rate of infantile mortality and finds that differences "neither in poverty, bad housing, insufficient feeding, defective sanitation, disease, industrial occupation of women, nor malnutrition of mothers can be regarded as adequate to explain the excessive and widespread difference between urban and rural rate of infant mortality." Dr. Stevenson believes that chances of survival differ but little at birth in town and in the country, but the noxious influences of the former soon come into play, and make themselves felt to an increasing extent as the first year of life progresses, and to a still greater extent in the second and third years.

Brend believes that the noxious influence is "a smoky and dusty atmosphere and that as a cause of infant mortality it transcends all other influences," and if one of the main effects of soot is to cause bronchitis and lower the resistance of the respiratory organs then his argument is borne out by such figures as these:

Roughly 1/12th or all the deaths in England and Wales are due to respiratory diseases. In Manchester the respiratory death rate is twice as great. For all rural England the infantile death rate for 1928 due to pneumonia and bronchitis was 8.8, for the county boroughs 16.27, and for Manchester 23.16.

Professor Sir Leonard Hill, M.B., F.R.S., in a lecture at the Royal Sanitary Institute Congress at Bournemouth in 1922, said:

"Men live long who work in the clean open air of the fields: thus the expectation of life of females at birth in Westmoreland is 61, in Middlesborough 46 years. This is not merely a matter of greater infant mortality, for at age 15 the difference is 5½ years. Similarly for young adult females, Surry County has an advantage of nine years over smoky industrial Oldham, while the urban mortality per 1,000 living on the whole for males is one-third greater than the rural mortality—a proportion which has not changed in the last 50 years, although the mortality has

been generally lowered. This difference is very striking considering the good water supply, drainage and cleaning of the cities and the higher wages earned by city workers. . . ."

"In this country tuberculosis still kills and maims each year almost as many civilians as the great war did of our soldiers. In Japan there is now happening just what happened in England during the rise of industry at the beginning of the last century. Some 210,000 fresh girls are coming annually into the cotton mills from the country districts, while some 80,000 girls in the mills are annually discharged for sickness, and no less than 70 per cent of all their deaths is due to tuberculosis."

Seltman concludes that a deposit of coal in the lungs, as soon as it reaches a certain degree, diminishes the gaseous exchange by decreasing the breathing surface, checks the formation of blood, and so causes anemia and dyspnea. Vital statistics afford the most readily available standard of comparison. Dr. Louis Ascher concludes from his statistical studies, "The increase in the mortality of acute lung diseases must be the result of some harmful factor which, it is true, is found in agricultural communities, but with a much higher increase in industrial centers. This factor is not limited to the places of industrial work but is also found in the homes, as proved by the mortality tables for infants and old people. The cause of this increase can only be the smoke of the coal fires."

Trudeau's experiments on animals are considered by some authorities as evidence of the importance of sunlight in the cure of tuberculosis.

Trudeau says (*An Autobiography of Edward L. Trudeau, M.D.*) "Lot 1, of five rabbits, were inoculated with pure cultures and put under the best surroundings of light, food and air attainable.

Lot 2, of five rabbits, inoculated at the same time and in the same way, were put under the worst conditions of environment I could devise.

Lot 3, of five rabbits were put under similar bad conditions without being inoculated.

Lot 1, I turned loose on a little island in front of my camp at Paul Smith's, where they ran wild all summer in the fresh air and sunshine, and were provided with abundant food. Lot 2 and Lot 3 were put in a dark, damp place where the air was bad, confined in a small box and fed insufficiently. The results showed that of the rabbits allowed to run wild under good conditions, all, with one exception, recovered. Of Lot 2, the same as Lot 1, but put in unfavorable surroundings, four rabbits died within three months and the organs showed extensive tuberculosis. Lot 3, uninoculated animals, were then killed, and though emaciated, they showed no tuberculous disease.

This showed me conclusively that bad surroundings of themselves could not produce tuberculosis, and that when once the germs had gained entrance to the body the course of the disease was greatly influenced by a favorable or an unfavorable environment."

#### EFFECT OF AIR POLLUTION ON THE EYE

Solid and vaporous ingredients of smoke-begrimed air irritate the sensitive membranes of the eye, and aggravate or cause inflammatory conditions, increasing susceptibility of the tissues to conjunctivitis. The functional efficiency of the eye may also be more or less disabled by the constant irritation of solid particles.

That smoke materially decreases the limits of visibility is evident when we learn that these limits vary with the number of dust particles in the air. For example, 1000 particles per cubic centimeter render large objects like mountains invisible at a distance of 100 miles; 100,000 particles render them invisible 1 mile away, and 1,000,000 particles 1/10 of a mile distant (Aitken).

The optical value of *good daylight* can hardly be overestimated. Daylight is relatively colorless because it contains both chromatic and achromatic light. A bright

colorless illumination is best from the standpoint of visual efficiency and health. It is less fatiguing than colored light or than intense or dull artificial light. Electric lights never quite replace daylight and are often too intense because of the proximity of the light or because the rays are thrown directly into the eyes or directly upon the object under observation. These conditions may lead to overstimulation of the sensitive layers of the retina. During the dark days which are common in manufacturing cities lights must be kept burning in the homes, schools, shops, and factories all day. This fact has been determined by Blair for the Pittsburgh schools. Even on clear days the lights must be turned on very early in the evening. The intensity of artificial illumination does not always meet the requirements of visual health. Worse still is the condition of those who, through financial limitations, must work in the dark gloom of smoky days without the aid of artificial light.

J. E. Wallin (*Optical Illusions of Reversible Perspective*, 1905) has shown in a special experiment on the visual estimation of distances that bright objects are judged to be nearer the observer than similar black objects when placed at the same distance. If this is true, anything on which the eyes must be fixated in darkened illumination will be imperfectly envisaged. To overcome this optical handicap, there is a strong tendency to move the object too near the eyes. If done repeatedly this entails a severe strain on the muscles of accommodation, causing increased muscular fatigue, which may result in muscular imbalance. On the other hand, by illuminating an object with good daylight it will be made to appear nearer to the eye. The result is that objects will actually be held at a greater distance and distant objects will be seen without eyestrain.

#### PSYCHOLOGICAL ASPECTS OF AIR POLLUTION

The psychological effects of smoke are direct and indirect (Mellon Institute of Industrial Research and School of Specific Industries, *Smoke Investigation Bulletin*, No.

3). The indirect effects result from bodily changes produced by smoke or smoke-produced weather states, while the direct effects are due to the influences of the mind's own states upon its subsequent thoughts, disposition, and conduct. Smoke diminishes the potential reserve, working capacity, and well-being of the individual, increases fatigue, irritability and restlessness, whereas sunshine exerts an exuberant influence on the feelings, thus producing a superabundance of energy.

Dark clouds have a depressing, devitalizing effect. They may cause fear in children, and reduce working efficiency.

Our knowledge of the psychological reactions to atmospheric smoke pollution should be increased by systematic research using the questionnaire method and the experimental method with controlled subjects, controlled apparatus, and controlled smoke rooms.

## EFFECT OF AIR POLLUTION ON CLIMATE AND HEALTH

### *Fogs.*

Meller says, "The presence of sulphur acids resulting from combustion of fuel is believed to increase the probability of the formation and maintenance of fog in two ways.

(1) In the presence of sunshine, nuclei are formed which have such an affinity for water that condensation sets in at temperatures higher than the saturation temperature.

(2) Chemical affinity soon arrests the process of differentiation referred to, so that the fog particles maintain a small size and may be supported in the atmosphere for a long period."

Measurements made at the Mellon Institute showed that the weight of solids per 1000 cubic feet of air was twice as great in smoky atmosphere as in clear air.

Aitken says, (*Transactions of the Royal Society of Edinburgh*, v. 30, p. 337-368, 1883) "On account of the affinity between dust particles and vapor, each dust particle tends to take the same amount of vapor. This tends to equality in

the size of cloud particles and tends to prevent formation of larger drops by collision and union of cloud particles. As a result, the condensed vapor eloud instead of falling in minute parts as rain, tends to fall as a whole, the air becomes so loaded with the water held in the mechanical suspension that it is dragged downwards by its weight, causing fogs."

Brodie's data, with discussion, (*Quarterly Journal of the Royal Meteorological Society*, v. 31, p. 15-28) show steady decrease of fog since 1890. He thinks the result is largely due to substitution of gas for coal fuel.

Russel says (*Nature*, v. 39, p. 34-36) (Abstract of address delivered March 1, 1888, under the auspices of the Smoke Abatement Institution): "If London were to cease using fuel in the solid form, it would be as free from fog as the surrounding country." He diseusses the economic disadvantage and the "moral reaction" of smoke and fog.

The following is an extract from Dr. René Sand's letter to Dr. E. H. L. Corwin, January 26th, 1931, in regard to the fog in the Meuse Valley: "The question of the 'deadly fog' in the Meuse Valley is in the hands of a committee. Many young and perfectly healthy people have died from it, and there is not the slightest doubt that some fumes (fluorhydrie acid or sulphur dioxid), which are thrown daily in great quantities into the atmosphere by loeal factories, have been brought down near the soil and have accumulated through a very rare combination of atmospheric circumstances such as absolute quietness of the air, persistent and dense fog. It has always been a matter of surprise to me that factories are permitted to pollnte the streams and the atmosphere without practically any check. One knows that in a radius of several miles around certain factories, trees wither and grass does not grow. When motoring through certain parts of the Meuse Valley, one is often half choked by poisonous fumes. Still we leave it at that, although as you know, devices have been found which would not even be very costly, as they permit the recovery of certain valuable chemical substances. The present sit-

uation is one of the worst examples of stupidity and neglect."

#### EFFECT OF AIR POLLUTION ON VEGETATION AND SECONDARILY ON HEALTH

Delepine says, "The large amount of arsenic in soot causes a marked arsenical contamination of the air in Manchester and may account for the bad effect of air on vegetation."

Meller believes that the injury done to vegetation by the soot in smoke is probably due chiefly to the accompanying ash, tar, and gases. Fumes containing sulphur dioxide and sulphur trioxide do considerable injury to vegetation. It is also known that certain of the hydrocarbon gases, carbon monoxide, hydrogen sulphide, and carbon disulphide are injurious to plants.

Soot is poisonous to vegetation as evidenced by external appearance, and also by internal appearance as shown by the size of the annular rings and by lesions in the leaves.

Professor F. E. Wynne, Medical Officer of Health for Sheffield, in a paper read at Lancaster in March, 1929, said: "The damage done by the deposition of soot can be more accurately measured in the case of vegetable life than animal life, and this has been done by Dr. A. E. Rushton of Leeds University. In one of his experiments, hollyhocks from the parent stock were grown in tubs of identical soil in different parts of the city. In the most polluted part of the industrial area, during the second year of the experiment, only one plant survived. It grew to a height of nine inches and failed to flower. In a comparatively smokeless area, some miles north of the city, a growth of eight feet was obtained with full flowering. The damage caused by soot therefore begins with vegetation and its consequent deterioration of our milk and meat supplies."

Professor Sir Leonard Hill (1922) states: "The choking of the leaves by tarry matter and the sulphur acids in

the smoke destroys vegetation and lessens the pleasure and health derived from the cultivation of gardens and the use and enjoyment of public parks. Radishes and lettuces grown at stages between the center and the suburbs of Leeds show enormous increase in size concurrently with the great distance between the producing ground and the city. The destruction of vegetation is of very great importance to health, not only from the æsthetic side but from the fact that fresh green foods and the milk of cows fed on such are protective foods containing vitamins essential for health, growth and breeding. The want of these is one of the great causes of malnutrition, disease and infertility in our big cities."

### *Prevention of Air Pollution.*

Prevention is the only cure. This is primarily an engineering problem and concerns the Department of Health. The laws seem to be sufficient in number and probably are sufficiently drastic in the present state of our knowledge. Complete realization of the importance of air pollution to health and aroused public opinion will undoubtedly strengthen the position of our courts in dealing with this important problem.

### SUMMARY AND CONCLUSIONS.

1. There is an air pollution problem in New York City and other cities, which is a serious menace to health.
2. Although sanitation has progressed in many ways, the important problem of air pollution is still inadequately controlled.
3. The main sources of air pollution are locomotives, chimneys, boats, and automobiles.
4. Legislative and remedial measures at the present time are concerned with visible smoke alone, but the invisible products of combustion, sulphuric acid, sulphur dioxide, arsenic, carbon monoxide, carbon dioxide, and other poisons are a serious menace to health.



5. Instruments, apparatus, and methods are available for the detection and analysis of air pollution.

6. That air pollution exists in New York City is shown by the fact that deposits in New York in 1930 averaged 3.97 tons per square mile per month. The United States Public Health Records showed a large relative loss of light and healthgiving rays in New York City in 1927 and the presence of soot was a contributing factor. In some cases the average hourly or daily loss was greater than 50 per cent and the average daily loss for the year was 21.5 per cent. Studies of the carbon monoxid content of the air in New York City streets by Yandell Henderson showed that the amount of this poisonous gas was sufficient at times to produce deleterious effects.

7. Inhalation of carbon particles and irritating fumes lower the resistance of the nasal mucous membrane, rendering it susceptible to acute and chronic infections which may involve the ear. Enlargement of the tonsils, redness and congestion of the pharynx and larynx have also been ascribed to atmospheric pollution. Smoke likewise irritates the membranes of the entire respiratory tract, predisposing to pneumonia, and emphysema. Certain types of air pollution may sensitize the individual and produce allergic manifestations.

8. According to Oliver, "something is present in soot which irritates the skin and leads to cancer." This substance is now thought to be tar and may be a possible factor in the causation of cancer of the lung, the incidence of which is apparently increasing.

9. The sensitive membranes of the eye are inflamed by gases and particles of carbon, thus increasing the liability to conjunctivitis. Artificial light, necessary because of the smoke laden atmosphere, may be so intense as to overstimulate the sensitive layers of the retina, and low artificial and daylight illumination may cause eyestrain.

10. Smoke diminishes the potential reserve, working capacity, and well-being of the individual, and increases

fatigue and irritability, whereas sunshine exerts an exuberant influence on the feelings.

11. Although soot has a bactericidal action (Holman, W. K., *Am. Journal Public Health*, vol. 3, No. 11), smoky and humid weather conditions increase the bacterial content of the air (Russel, F. A. R., *Smithsonian Report*, 1895) and fogs increase the prevalence of disease. René Sand says that many young and healthy people died from the deadly fog in the Meuse Valley, due to fumes from local factories (fluorhydric acid or sulphur dioxid) which accumulated near the ground through a rare combination of atmospheric circumstances.

12. Vegetation is injured by smoke, as evidenced by experiments with plants grown in identical soil in smokeless and smoke-polluted districts.

13. That air pollution has a definite effect in increasing the incidence and death rate from tuberculosis is borne out by the classical experiments of Doctor Trudeau on animals; the accepted bactericidal action of sunlight; the healing reaction exhibited by extra-pulmonary tuberculous lesions when treated by the ultra-violet rays of the sun, and finally the low tuberculosis death rate of the states in which the population is largely rural as compared with the eastern industrial states.

14. The offensive odor of the exhaust smoke of automobiles, and of burning garbage and refuse, is not only a source of annoyance, but the odor may be so disagreeable as to disturb sleep.

15. Prevention of air pollution is a public health and engineering problem; the law is sufficiently comprehensive in the present state of our knowledge, but it should be strengthened by aroused public opinion and by courageous court action.

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## DEATHS OF FELLOWS OF THE ACADEMY

SAMUEL MORLEY EVANS, 20 East 76th Street, New York City; graduated in medicine from the College of Physicians and Surgeons, New York City, 1895; elected a Fellow of the Academy January 4, 1900; died August 19, 1931.

JOHN PIXLEY MUNN, M.D., 18 West 58th Street, New York City; graduated in medicine from Bellevue Hospital Medical College in 1876; elected a Fellow of the Academy, October, 1882; died, August 15, 1931. Dr. Munn was a Fellow of the American Medical Association and a member of the County and State Medical Societies. He was medical director and later president of the United States Life Insurance Company and from 1879 to 1892 was curator of St. Luke's Hospital.

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## EDITORIAL

### AN OUTLINE OF THE HISTORY OF THE CIRCULATORY SYSTEM<sup>1</sup>

The development of our knowledge of the circulatory system, its anatomy, physiology, pathology and surgery, is perhaps the most momentous and consequential episode in the general development of medicine. For the function of the circulation begins where those of digestion and metabolism leave off and ends at that vague borderland in the tissues where its business is taken over by respiration. Nothing worthwhile was, or could be known about the circulation until its true structural basis had been ascertained. Further progress was then actually obscured by anatomical reasoning (*anatomia animata*), for true physiological reasoning about the motion of the blood and its consequences had to wait upon the factor which Sarton signalizes as most decisive in the making of recent science, namely instrumentation. Harvey's ligations and meas-

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<sup>1</sup>In preparing this review, the writer is indebted principally to the idiomatic translation of Harvey's *De motu cordis* by Professor Chauncey D. Leake (Baltimore, C. C. Thomas, 1931), with his scholarly annotations; to the treatise on *Diseases of the Heart and Aorta* by G. A. Gibson (Edinburgh, 1903), which contains the first thoroughgoing bibliographic investigation of the history of circulatory disorders; and to the very exhaustive and handy arrangement of essential data in Sir Humphry Rolleston's *Harveian Oration* (Cambridge, 1928). The chapter on the circulation in Dr. Stephen d'Irsay's unpublished *History of Physiology*, which I have had the pleasure of reading, contains an ingenious discussion of mooted points and borderline problems, some of which are beyond the scope of the present article. His work is creditable to the Leipzig Institute.



urements, Malpighi's microscope, Hales's blood-pressure tube, Ludwig's kymograph, Marey's sphygmograph, the Einthoven string galvanometer, did more to enlighten us than nineteen centuries of guess-work and footless speculation, from Erasistratus to Cesalpinus. The watch, the stethoscope and the tonometer established the modern approach to a scientific diagnosis of disorders of the circulation. The ligation of arteries, from Celsus to Carrel, was the most going principle in operative surgery, apart from such comparatively recent innovations as anæsthesia, antisepsis and the abolition of shock.

Two observations of prehistoric man go to show the importance attached to the heart and the blood from the earliest times. Mural paintings of bison and mammoth in prehistoric caverns sometimes indicate the position of the heart by an appropriate figure or cross-mark, as a sort of memorandum for the huntsman, betokening, Singer thinks, an "anatomical instinct," like that displayed by the ichneumon fly in administering the *coup de grâce* to other insects. It is certain, also, that the fading out of life in hæmorrhage from a fatal wound left its mark upon the primitive mind. The flowing blood became associated with the idea of being alive, as evidenced by the words employed in the ancient Teutonic spells for hæmostasis (Sudhoff). The ancient Assyrians also knew that pressure on the carotid arteries abolishes consciousness. And here, at once, we have the starting point of the humoral pathology and of prehistoric surgery. What Sudhoff calls huntsman's and butcher's anatomy of the heart in animals was further advanced by "sacrificial anatomy," the knowledge gained from viewing the pulsating heart thrown down before the altar. This purview of the autonomous, extra-vital heart-beat was, in some respects, the best hint the ancients had, but they were in no position to draw inferences from it. The pseudo-Hippocratic tract *De corde* (400 B. C.) already views the heart as a muscle. Dissection of animals brought out its relation to the vascular system, the crude diagrammatic schema of the veins and

arteries known to Aristotle and the Alexandrians (Five Picture Series), while venesection and battle-wounds led to inferences from the oozing and spurting of blood. The sanguine appearance and weight of the liver, already noted by Empedocles (Fr. 150) as *polyhaematon hepar*, led Aristotle to the unlucky inference that it makes blood, hence must be the starting point of the circulation. From the fact that the arteries are relatively empty at death, Praxagoras, Herophilus and Erasistratus inferred that they contain air (*pneuma*). Herophilus (300 B. C.) timed the pulse with a water-clock and originated the complex pulse-lore (*ars sphygmica*), taken over by Galen and current up to the Napoleonic period. Erasistratus named the tricuspid and sigmoid (semilunar) valves, noted the chordæ tendineæ, inferred the existence of adjacent mouths (*synanastomoses*) at the terminals of the ultimate ramifications of the arteries and veins, and even noted a wave-like progression of the pulse, subsequently denied by Galen. From the old Ionian notion that all things are in a state of flux (*panta rhei*) and that cosmic and organic processes move in cycles or circles (Heraclitus), it was not difficult for Erasistratus to infer some sort of dual circulation which, however, he described backwards: from the liver to the heart by the arteries, from the heart to the lungs by the veins, with liver and heart as primary and secondary source-pumps, implying two periodic oscillations. By arteriotomy in living animals, Galen demonstrated that the arteries contain not air, but blood. From the simple observation that the blood pulsates between the heart and a ligated artery, Galen demonstrated the motor power of the heart and confirmed its extra-vital autonomy in the excised hearts of sacrificial animals. Galen's scheme of the circulation took over the duplex motor (heart-liver) system of Erasistratus, but inferred a centrifugal motion of the blood from the heart *viâ* the arteries and from the liver *viâ* the veins, with a consequent shuttle-wise ebb and flow through the two channels<sup>2</sup>, the only means of communication between

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<sup>2</sup>This idea may have gained currency from Aristotle's perplexity over the violent flux and reflux of the tide of the Euripus, which Leake describes

the two circulations being certain imaginary pores in the interventricular septum<sup>3</sup>. Into all this, Galen injected the mysticism associated with the idea of the *pneuma*. The arterial blood acquires vital spirits from the right ventricle, the venous blood natural spirits from the liver and both are converted into animal spirits in the brain. Over and above this complex scheme stood Aristotle's notion of the primacy of the heart as the "Acropolis of the body,"<sup>4</sup> indeed the actual organ of thought and origin of the nerves, an inference derived from the fact that he mistook the linear fibres in the ventricles of larger animals for nerves emanating from the heart.

For nearly fourteen centuries, this Galenic scheme of the circulation, with its well-imagined permeable septum, its twin motors, its duplex centrifugal currents, its intervention of vital, natural and animal spirits, its view of the lungs and the brain as cooling plants, held its own, along with the Aristotelian notion that the heart is the locus of thought. The chronologic arrangement of usages of the word "heart" in Murray's English Dictionary affords an astonishing perspective of the persistency of our ancestors' belief that the heart thinks. In spite of the phrenological diagrams of the Middle Ages and the superstitions about animal spirits, the fact that the brain does the thinking (Alcmæon, Pythagoras) was not definitely settled until the time of Flourens. After Harvey's time, the locus of thinking was transferred from the heart to the blood, which apparently goes back to Empedocles (Fr. 105):

"In the blood-streams, back-leaping unto it,  
The heart is nourished, where prevails the power  
That men call thought; for lo the blood that stirs  
About the heart is man's controlling thought."

What happened between Galen's time and Harvey's?

<sup>3</sup>Probably an inference from the actual Thebesian veins (Leake), or the patency of the foramen ovale in certain adult animals (d'Irsay).

<sup>4</sup>Aristotle: *De partibus animalium*, III. Cited by d'Irsay.

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as "A narrow channel 113 miles long between Euboea and Boeotia, opposite Chalcis." (foot-note I to *De motu cordis*, Ch. I.). Galen (*De usu partium*, VI, 10) says that without the veins, the blood would "tide-like, as the Euripus, flow back and forth in a way not suited to it."

At least thirteen centuries of facile acceptance of Galenic dogma, with an additional century or more of speculation, set off by a number of lucky inferences and a solitary ligation experiment by Cesalpinus. The high spots were Leonardo's delineations of the valves of the heart<sup>5</sup> and the moderator band and his demonstration of the cardiac impulse by needling (Iliad), all which remained buried for centuries; the discovery of the valves in the veins by Canano and Estienne (1551) and their delineation by Fabricius ab Aquapendente (1574); the discovery of blood in the pulmonary veins by Servetus, with his denial of the permeability of the septum hence the first correct account of the pulmonary circulation (1553); and the two capital discoveries of Cesalpinus, that the vena cava does not originate from the liver and that the flow of blood in the veins is centripetal (1571), with his subsequent experimental proof of this fact, from the swelling of a vein below the ligation (1593). Vesalius describes the left auriculo-ventricular valves of the heart as "mitral," and while playfully accepting the dogma of a permeable septum in his first edition (1543), adopts the correct view of Servetus (1553) in the second edition of the *Fabrica* (1555). Cesalpinus confirms Servetus's view of the pulmonary circulation, describes the flow of blood, from the right ventricle through the pulmonary artery to the lungs and its ultimate return to the left ventricle, as a *sanguinis circulatio*; grasps the function of the cardiac valves and calls the terminal twigs of the blood-vessels *capillamenta*; obliterates the liver as a source-pump of blood and first establishes the flow of venous blood toward the heart. But in lieu of capillary anastomosis, he conceives of a kind of attraction (*auctio*) of blood between the arterial and venous terminals, fails to perceive the ultimate identity of arterial and venous blood, and so conceives of a circulation with a solution of continuity at the "*osculi communicantes*" (the old Galenic *synanastomoses*). Nevertheless, the main facts about the circulation were more

<sup>5</sup>Leonardo called the cardiac valves "portals" (*porte*) or "outlets" (*usciole*). D'Irsay, footnote 11.

or less in the air, as matters of speculation, when Harvey began his work. Long before Cesalpinus and Columbus, certain Spanish anatomists, Lobera de Avila (1542), Plata (1545), Monserrate (1551), had tried to improve upon the old Galenic framework and one of these, a veterinarian, Francisco de la Reina, adumbrated the circulation (1552), some 20-43 years before Cesalpinus.

What then did Harvey accomplish? To open the *De motu cordis* is to enter the laboratory of the ablest investigator of comparative anatomy and physiology since Aristotle and Galen. To read it is like reading Beaumont's book of experiments on gastric digestion. Everywhere, we are conscious that Harvey wishes to abandon speculation and actually tries to make us see how the heart works, how the blood flows in vivisected animals, even as Beaumont visualizes the interior of the stomach *in situ* through his accidental experiment in physiological surgery. Applying his plain, practical common sense to Galen's postulates, Harvey proceeds, step by step, to demonstrate every point he makes by actual vivisection and experiment. In his Introduction, he makes a clean sweep of the errors of the ancients. Next he analyses the mechanism of events in the cardiac cycle and demonstrates that the heart is not a suction pump but a force pump, the ventricles being filled by auricular contraction (Ch. III); next he considers the effect of the pumping action on the arteries (III); next the rôle of the auricular contraction in the production of heart-beat, heart-block, and venous pressure, and the longevity of the right auricle at death (IV). Then the mechanisms of auriculo-ventricular rhythm and of the heart sounds (V); then the comparative anatomy and physiology of the blood-flow into, through and out of the heart (VI-VII); next the proof of the circulation of the blood by a quantitative demonstration, viz., that, within brief time-units, the heart will pump out blood in excess of what can be fabricated from the food or of what is needed by the system or of the total volume of blood in the body or even of the total weight of the body (VIII-

IX); finally the proof of the major circulation and of the necessity for capillary anastomosis, or its equivalent, by innumerable vivisections and ligation experiments (X-XIII). Chapter XIV states the conclusion of the whole matter. Chapter XV is philosophical and speculative. Chapter XVI considers the application of the new doctrine to the practice of medicine. Chapter XVII deals with the comparative physiology of the circulation in man and animals. The terminal sentence of Chapter IX announces a consideration of "the place, manner and purpose of arterio-venous anastomosis," but the *salto mortale* is never taken, and in Chapter XI, Harvey concludes "that there is either an anastomosis of these vessels or pores in the flesh and solid parts permeable to blood." The supreme finishing touch had to wait upon Malpighi's microscope (*De pulmonibus*, 1661). As Fraser Harris observes, Harvey's demonstration made capillary anastomosis a logical necessity; Malpighi made it a histological certainty.

Harvey's demonstration, then, takes us into an entirely different atmosphere from the closet and studio speculations of his Spanish and Italian precursors. We are in the full current of essentially modern laboratory experimentation, with no whirligig proofs, but extraordinary leaps forward into the medicine of the future. Harvey was the first to elucidate the apex-beat (II), the possibility of "fibres spirally arranged" (II, MacCallum and Mall); the mechanism of the heart-beat, and of physiological heart-block, venous blood-pressure<sup>6</sup>, resuscitation of a stopped heart by a perfusion experiment<sup>7</sup> (IV); the

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<sup>6</sup>"When the auricles contract, they become pale, especially when they hold little blood, for they are filled as reservoirs, the blood freely pressing toward them by the compressing motion of the veins. *De motu cordis*, IV. Cited by Leake.

<sup>7</sup>"In an experiment one time on a pigeon, after the heart had stopped, and even after the auricles were motionless for some time, I placed my finger, warm and wet with saliva, upon the heart. By this warm application, it recovered life and strength. The auricles and ventricles beat, alternately contracting and relaxing, as if recalled from death." *Op. cit.*, IV.

pulse as an expression of the pumping action of the heart, the heart sounds as a species of intra-thoracic pulse (V), the possibility of "vascular openings" (anastomoses) through the lungs (VII); the ultimate excess of stroke-volume output over total volume of blood (VIII-IX); the effect of physiologic, dietetic and psychic factors upon cardiac output and velocity of the blood-current<sup>8</sup> (IX); and the relation of the pumping action of the heart to virtual arterial blood-pressure (XI, XII, XVII). Leake even notes some vague hints of the lacteals ("milky vessels," XIII), cutaneous absorption of drugs (XVI), valvular incompetence<sup>9</sup> (XVII), vaso-constriction and vasodilatation<sup>10</sup> (XVII), and d'Irsay some glimpsing of auricular fibrillation<sup>11</sup> (IV). Harvey even boiled a heart to get at the ultimate arrangement of its fibres (XVII). Some of his experiments have been visualized by Lewis and Dale in the Harvey Film. His main errors were to hug the old superstition about the cooling function of the lungs and to attribute the heart-beat to "innate heat," which Sir Clifford Allbutt identified with oxygen. Again, Harvey ignores Copernicus and Kepler when he likens the circular motion of the blood to the old Ptolemaic notion

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<sup>8</sup>Recently confirmed by A. Grollman in *Am. J. Physiol.*, 1929-30, LXXXVIII-XCIV, *passim*. Cited by Leake.

<sup>9</sup>"They are not present in all animals, for the reason stated, nor do they seem to have been made with the same efficiency in those in which they are found. In some they are made to fit exactly, in others poorly and negligently, so that they may be closed according to the greater or lesser impulse from the contraction of the ventricles." *Op. cit.*, XVII. Noted by Leake.

<sup>10</sup>"So the terminal arteries appear like veins, not only in structure, but also in function, for they rarely show a perceptible pulse unless the heart beats more violently, or the arteriole dilates or is more open at the particular point." XVII.

<sup>11</sup>"Besides this, I have sometimes noticed, after the heart and even the right auricle had completely stopped beating, that a slight motion or palpitation remained in the blood in the right auricle, as long as it seemed imbued with heat and spirit." IV. At this point (*see supra*), Harvey transfers the old Aristotelian primacy of the heart to the blood, and apparently by mistaking virtual auricular fibrillation for "palpitation of the blood."

of "the circular motion of the stars." (VIII). Harvey's literary manner is sometimes diffuse but never obscure. As Leake surmises, some of his chapters were evidently assembled hastily from rough notes, and the promised chapter on the inter-ventricular septum, the tracts on respiration, on the spleen, on practice of medicine, were never written, or else destroyed by the Roundhead troopers, who invaded Harvey's chambers at Whitehall in 1642.

The height of Harvey's great argument, then, is the first employment of measurement in any biological investigation of magnitude. Galen had pointed out, what any butcher knows, that the whole volume of blood (V) in an animal body can be drained out in less than 15-30 minutes. If the discrete stroke-volume quantum of the cardiac output in unit time be Q, then for total quanta in increasing time intervals ( $t_1, t_2, t_3 \dots$ ), Harvey shows that  $V < Qt_1 < Qt_2 < Qt_3 \dots < Qt_n$ .<sup>12</sup> This little excursus into mathematical physics puts him miles and marine leagues ahead of his competitors, as a practical, common-sense investigator, thinking in advance of his time.

Harvey's *opus magnum*, printed at Frankfurt on the Main, the great center of the continental book trade, exerted a profound influence upon the physiologists of his time. The fact that it caused a distinct falling off in his bedside practice is negligible. He was but an indifferent practitioner. But it is known that he contemplated the publication of his own clinical observations on "the innumerable diseases concerned with disorders of the circulation and their cure," and, in fact, cites some of these in Chapters III, XI and XVI of the *De motu cordis*. But little was known about diseases of the heart and disorders of the circulation before the 18th century. The Hippocratic Canon contains the first mention of auscultation (friction sound and succussion in pleurisy). Herophilus counted and analyzed the pulse, Galen distinguished between traumatic and spontaneous aneurism, for which Antyllus devised the treatment by ligations which goes by his name, but

<sup>12</sup>*nobis*.



of heart disease the Greeks knew nothing. The *morbus cardiacus* of the ancients (Celsus, III, 19) was a condition of extreme debility, with small, weak pulse, gastric atony and colliquative perspiration, obviously not of cardiac origin. The pseudo-Hippocratic *De corde* regarded heart disease as non-existent (*cor aegrotare non posse*). The therapeutic use of the heart of small animals was a superstition attaching to the chthonian neuropathology, but it was never applied to heart disease, the existence of which continued to be denied or ignored well nigh unto the end of the 17th century. The diagnosis between aneurisms of the thoracic and the abdominal aorta by Vesalius (1557) was perhaps the most outstanding pathological observation between Galen and Vieussens. Fernelius made post-mortems of internal aneurisms and was the first to associate the condition with syphilis (1542). Paré attributed aneurism to the use of mercurials (1582). Nicholas Massa is said to have noted cardiac (myocardial) hypertrophy. Aortic stenosis was first observed by Riverius (1646) and mitral stenosis by the physiologist John Mayow (1669), possibly also by Harvey. Bonet, in his *Sepulchretum* (1679), noted cardiac "polypi" with palpitation and precordial pain, pericardial adhesions and effusions, myocardial calculi and inflammation. But real knowledge of heart disease, particularly of valvular lesions begins with Vieussens (1715), Albertini (1721), Lancisi (1728), Senac (1749) and Morgagni (1761).<sup>13</sup> Vieussens, who was the first to correlate the semeiology of heart disease with the pathological lesions, noted a case of absence of the pericardium in a double heart (1672), two cases of pericardial dropsy (1673), which led him to the correct diagnosis of a third case (1675), subsequently confirmed by post-mortem (1676), and left two masterly delineations of the symptoms and pathological appearances of aortic stenosis (1695) and mitral stenosis (1715), with a notation of the character-

<sup>13</sup>For a detailed account of these contributions to cardiac pathology, see P. J. Philipp: *Die Kenntnis von den Krankheiten des Herzens im achtzehnten Jahrhundert*, Berlin, 1856.

istic "jerking pulse" of aortic stenosis, subsequently associated with the name of James Hope (1839). Vieussens' treatise on the heart (1715)<sup>14</sup> is the most important contribution to the subject in the 18th century. Lancisi's monographs on sudden death (1707)<sup>15</sup> and aneurism (1728)<sup>16</sup> are the classical contributions on so-called cardiac aneurism,<sup>17</sup> stressing its fatality, its multiplex ætiology (heredity, mechanical obstructions, emotional depression, over-exertion, alcohol, syphilis), the irregularity and inequality of the pulse and the exaggerated cervical venous pulse. Albertini, a pupil of Malpighi and a teacher of Morgagni, devoted himself to organic heart diseases (1726)<sup>18</sup>, in particular cardiac dilatation and hypertrophy. He pointed out that the right side of the heart is most liable to dilatation, the left to hypertrophy, introduced palpation in the diagnosis, and, following Valsalva, who treated aneurism by a 40-day rest and starvation cure (with preliminary venesection) and applied this method to cardiac hypertrophy and dilatation with considerable success. Morgagni's *consilia* on diseases of the heart are found in the second book of his *De sedibus* (1761). With Auenbrugger, whose classic on percussion was published in the same year, Morgagni was the first to stress the importance of physical signs in the diagnosis of diseases of the chest. He made the first clinical notation of Stokes-Adams disease, revised the semeiology of pericardial dropsy, made a clear differentiation of cardiac hypertrophy and dilatation, added considerably to the semeiology of valvular diseases, associated cyanosis with or-

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<sup>14</sup>Vieussens: *Traité nouveau de la structure et des causes du mouvement naturel du cœur*. Toulouse, 1715.

<sup>15</sup>Lancisi: *De subitaneis mortibus, libri duo*. Rome, 1707.

<sup>16</sup>Lancisi: *De motu cordis et aneurysmatibus*. Naples, 1728.

<sup>17</sup>By cardiac aneurism, these writers usually meant general enlargement of the cardiac cavities (hypertrophy or dilatation). Real cardiac aneurism was first seen by Galeati (1751) and later by John Hunter and Matthew Baillier (Rolleston).

<sup>18</sup>Albertini: *Animadversiones super quibusdam difficilis respirationis citius a latere cordis et præcordiorum structura pendentibus*. Bologna, 1726.

ganic heart disease, elucidated the venous pulse and showed the effect of disease of the right heart upon pulmonary stasis and hæmoptysis and of pulmonary catarrh upon organic heart diseases. Senac wrote the first definitive treatise on heart diseases (1749)<sup>19</sup>, a book which attained its second edition 34 years later (1783) and which won the highest commendation from Morgagni and Haller. Senac first stressed the importance of pericarditis and its diagnosis, noted eccentric hypertrophy of the cardiac walls as a sign of cardiac "aneurism," elucidated cardiac "polypi" as post-mortem artefacto, emphasized the tendency to heart disease in the aged, the small flaccid heart of consumptives, and brought out several important points in the diagnosis of valvular insufficiencies and stenoses. All in all, this group of 18th century clinical pathologists achieved one of the most brilliant chapters in the science of disorders of the circulation.

In the year in which the *De motu cordis* was published, Malpighi, the founder of histology was born (1628). With the aid of the microscope, Malpighi added the coping stone to Harvey's demonstration by his discovery of continuous circulation of the blood through the capillary anastomoses in the frog's lung (*De pulmonibus*, 1661). At the same time, he saw the rouleaux of red blood corpuscles in the mesentery of the hedgehog, but mistook them for fat cells. These discoveries were confirmed by Leeuwenhoek in his *True Circulation of the Blood* (1668). That the erythrocytes are common to arterial and venous blood was a further confirmation of the circulation. That the real and only difference between arterial and venous blood is chemical was surmised by Harvey in his Introduction and ascertained by John Mayow (1668). Swammerdam saw and understood the erythrocytes as early as 1658, but his findings were not known until Boerhaave published the *Biblia naturae* in 1738. These discoveries are the vague beginnings of hæmatology, which really took its start with the cell-theory of Schleiden and Schwann

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<sup>19</sup>Senac: *De la structure, de l'action et des maladies du cœur*. Paris, 1749.

(1838-9) and its application to pathology by Virchow (1845-58). Early landmarks were the notations of chlorosis (*morbus virginens*) by Johann Lange (1554) and Friedrich Hoffman (1731), the initial account of purpura hæmorrhagica by Werlhof (1735), the introduction of human inoculation of small-pox by Timoni, Pylarini and Lady Mary Wortley Montague (1721) and of vaccination by Jenner (1798), the inoculation experiments of Stephen Wesszkremi (plague, 1755) and Francis Home (measles, 1759), John Hunter's auto-inoculation of syphilis (1786) and his treatise on the blood (1794). There arose the conviction that the blood is "a most peculiar juice" (Goethe, *Faust*), at once the locus of inflammation, of infection and transmission of syphilis, small-pox and other communicable diseases. William Hewson's "Experimental Inquiry" of 1771 was the starting point of a long line of first class investigations on the coagulation of the blood, notably those of Andrew Buchanan (1845), Alexander Schmidt (1861), Lister (1862), Hammarsten (fibrinogen, 1875) and W. H. Howell (1910-30). Leukæmia was described simultaneously by Virchow and John Hughes Bennett in 1845. Virchow, in fact, created the science of the leucocytes and of the pathological significance of embolism and thrombosis (1846-56). Knowledge of the third formed element of the blood, the platelets or thrombocytes, was developed by Alexander Donné (1842), Osler (1873) and Bizzozero (1883). Lagrange's findings on the oxygenation of the blood (Hassensfratz, 1791) were furthered by the discovery of hæmoglobin (Hoppe-Seyler, 1862-4) and were expanded to the general concept of tissue-respiration by the researches of Gustav Magnus (1837), Lothar Meyer (1857-8) and Pflüger (1866-8) on the gasometry of the blood. Endocrinology was foreshadowed in Théophile de Bordeu's treatise on the blood (1776) and began with Addison's descriptions of pernicious anæmia and suprarenal disease (1849-53) and Claude Bernard's experiments on glycogen (1848), pancreatic juice (1849) and fourth ventricle diabetes (1849).

Anaphylaxis (Bordet, 1901) had been noticed by Jenner (1798) and Magendie (1837) and John Hunter (1794) had stumbled upon the bactericidal power of blood-serum (Buchner, 1889). Serotherapy (Roux, 1889, Behring, 1893), bacteriolysis (Pfeiffer, 1894), hæmolysis (Bordet, 1898), serodiagnosis (Wassermann, 1907), were necessary consequences of the development of bacteriology and revived the humoral pathology. Phagocytosis was discovered by Metchnikoff (1892-5), who, in 1892, also adumbrated the reticular-endothelial system (Aschoff, Maximow). The science of the anæmias was developed by Ehrlich and Lazarus (1898). The hæmolytic effect of serpent venoms was investigated by Weir Mitchell and Reichert (1870-86), Flexner and Noguchi (1901-9) and the serotherapy of snake-bite by Fraser (1896) and Calmette (1896). All these developments of hæmatology, including those concerned with the transmission of infection by blood-channels, were consequent upon Harvey's conclusive experiments upon the circulation.

The most important contributions to the gross anatomy of the heart were probably the drawings of Leonardo da Vinci, which remained buried for centuries and were too far in advance of their time to be appreciated until latterly. Leonardo drew the valves of the heart, unrolled, in a kind of Mercator's projection, noted the moderator band and some features of the functional system, and was even a precursor of the cross-sectional anatomy of Pirogoff (1852-9), whose pictures of the heart and its tunic, sliced in different planes, are of great value with reference to the physics of intra-pericardial and intra-cardial pressure. The pseudo-Hippocratic view of the heart as a muscle, maintained by Harvey, Richard Lower and Stensen, was confirmed by Leeuwenhoek (*Arcana naturae*, 1695), who first described cardiac muscle and showed a certain structural similarity to ordinary striated muscle. The discovery of a new layer of spiral fibres by Krehl, MacCallum and Mall confirmed Harvey's view of lengthwise shortening of the ventricles in systole and brought out the view

of a stationary heart rotating on its long axis (d'Irsay). Extravital autonomy of the excised heart, known to Galen, was maintained by Harvey and established by Haller, who regarded the continual flow of blood in the heart as the primary stimulus of the mechanism, conditioned by the "irritability" of cardiac muscle. This myogenic view of the heart's autonomy was confirmed by the experiments of Gaskell (1882) and Engelmann, who demonstrated the automatic rhythmic contractile power in isolated strips of cardiac muscle. Meanwhile, the vagus nerve, known to Rufus of Ephesus, had long been regarded by many observers as the motor nerve of the heart, and the introduction of electric stimulation by Galvani (1792) tended to confirm this view. This neurogenic theory of cardiac action was disposed of by the brothers Weber (Omodei's *Annali*, 1845), whose experiments demonstrated that the action of the vagus is inhibitory, while Gaskell's great memoir on the vagus (1882) indicates that its function is regulatory, acting on occasion as spur and bridle, whip and snaffle to the heart, while motor influences originate from the ganglia discovered by Bidder (1852) in the sinus venosus. In 1855, Claude Bernard showed that stimulation of the first sympathetic ganglion in the left side of the thorax will revive a quiescent heart (Bezold, 1863). Finally, in 1902, Friedenthal confirmed autonomy by eliminating all the nerves. In Ludwig's laboratory, H. P. Bowditch first made an isolated heart beat in delphine solution (1871), demonstrated the step-wise contraction (*Treppe*) of cardiac muscle (1871) and (with Kronecker) that it will contract to the maximum extent or not at all ("All or none" 1871). Ringer's solution (1880-83), identical, for practical purposes, with the composition of the blood, indicated that the stimulus, if chemical (Haller), may reside in the blood itself. Thus, even as Goethe's Mephistopheles affirmed the blood to be *sui generis*, it became apparent that cardiac muscle differs from other muscle in obeying laws all its own. Concerning the neurogenic and myogenic theories of cardiac action, d'Irsay inquires: "Is there any thing essential at stake in the

whole problem? Is there any real problem? It does not touch the nature of the stimulus, nor the final reaction to stimulus (contraction) but seems to boil down to a question of conduction. . . . The experiment clears the importance of one, two, five factors and yet life operates with hundreds of them." We approach, then, the problem of the origin and situs of conduction in the autonomous heart. Long ago, Galen noted that the right auricle is the last part of the body to die. Harvey (IV) even affirmed that the blood in the right auricle palpitates "as if imbued with life and spirit," after the auricle itself has ceased to beat, and concludes that "whether life begins with a cardiac palpitation is doubtful." He thus transfers the primacy of the heart to the blood (the *punctum saliens* of Aristotle) and reasons that "What is made last in animals dies first, what first dies last." Harvey, indeed, found his *impetum faciens* of the heart beat in the "innate heat" of the blood, *i. e.* its oxygenation (Allbutt). He was, however, the first to notice that "the movement, seems to start in the auricles and to spread to the ventricles" (IV) and that "these two motions . . . are consecutive, with a rhythm between them" (V). The mystery of this auriculo-ventricular rhythm, which Harvey likened to the mechanism of swallowing, was first illuminated in the celebrated experiment of Stannius (1852), *i. e.* a ligature applied at the sino-auricular junction will stop the heart; a second ligature at the auriculo-ventricular groove will set up slow ventricular beats. The locus of inhibition and conduction lies, then, in the auriculo-ventricular region. Harvey, in fact, describes physiological heart-block as follows: "While the heart gradually dies, it sometimes responds with a single weak and feeble beat to two or three pulsations of the auricles" (IV). Muscular continuity between auricles and ventricles was first noted in reptiles by Gaskell (1883). Then came the discovery and description of the auriculo-ventricular bundle in mammals by Kent and the younger His (1893). Then Tawara's mapping out of the junctional or conductive system of the mammalian heart (1906), finally the discovery of the sino-

auricular node, the pace-maker of the heart, by Keith and Flack (1907). Before 1893, muscular conduction between auricles and ventricles was unknown and unthinkable. Meanwhile electric currents from contracting cardiac muscle had been demonstrated with the galvanometer by Matteucci (1843), in Kölliker's rheoscopic frog effect (1856), with Lippmann's capillary electrometer by Burdon Sanderson and Page (1878), by Gaskell (1881-2), and by A. D. Waller (1889), who subsequently utilized the Einthoven string galvanometer (1903) in the development of human cardiography (1907-8). With the polygraph, Sir James Mackenzie made his important studies of the pulse (1902) and with Sir Thomas Lewis, Wenckebach and others, developed the new science of the cardiac arrhythmias. In 1883, Wooldridge demonstrated innate rhythmicity in the total myocardium, in accordance with the reasoning of Gaskell (1882). The instrumentation for graphic records of these findings was afforded in Ludwig's invention of the kymograph (1847), in the sphygmograph (Vierordt, 1855, Marey, 1860), in plethysmography (Mosso, 1874) and phonocardiography (Hürthle, 1892-5). Estimates of blood-pressure began with the experiments of Stephen Hales (1723), were continued by Thomas Young (1808-9) and Poiseuille (1828-60), whose mercury manometer (1828) was made to record its findings by Ludwig (1847). Capillary blood-pressure was first investigated by von Kries (1875). Clinical estimates of blood-pressure were first made by Vierordt (1855). The sphygmomanometer of von Basch (1887) was modified and improved by Potain (1889), Riva Rocci (1896), Gaertner (tonometer, 1899) and by C. J. Martin, who revived the mercury column of Poiseuille (1905). Korotkoff added auscultation (1905), which made the method applicable to every condition except aortic regurgitation (Rolleston). The heart sound was first noticed by Harvey and was elucidated by Wollaston (1810), Laennec (stethoscope, 1819) and Turner (1829). The second heart sound was first described by Talma (1880) and the third by A. G. Gibson (1907) and Thayer (1908). Measurement of the velocity of



the blood-current was first made possible by the *Stromuhr* of Ludwig and Dogiel (1867). Harvey's original stroke-volume estimates of cardiac output were rough approximations, amounting virtually to an algebraic proof of his final argument. Estimates of total cardiac output have since been made by four different methods (Leake). The basal output has been found by Grollman to be a linear function of the surface area of the body (1929),<sup>20</sup> amounting ordinarily to  $2.2 \pm 0.3$  liters per square meter per minute. In 1829, Hering showed that the heart is never emptied. Hence, the main thing in Harvey's rough guesses was not so much the matter of meticulous computation as the mathematical accuracy of his reasoning. In 1748, according to d'Irsay, Daniel Passavant, accepting Harvey's estimate of cardiac output ( $1\frac{1}{2}$  ounces) and Stephen Hales' estimate of systolic pressure (8 feet), computed that the work done by the heart in an hour is equivalent to lifting 375 pounds to the height of 8 feet (400 kilogram meters). Tigerstedt got 343 kilogram meters. The discrepancy is due to the fact that, in all general equations or general formulæ in mathematical physics, friction, viscosity and other very real sources of dissipation of energy are apt to be overlooked. Down to the middle of the 19th century, the pulse was regarded as the tactile index of the blood-current, like the tick of a watch, and was thought to be synchronous in all arteries (d'Irsay). This error was corrected by the demonstration of wave motion within the blood-vessels and its consequences, by the Weber brothers (1850). Henle's discovery of vaso-motor nerves (1841), Claude Bernard's experiments on vaso-constrictor and vaso-dilator effects (1851-8), the elucidation of the depressor nerve by Ludwig and Cyon (1866), the new view of the capillary circulation gained by Dale (1918-19), Krogh (1922), Lewis (1927) and others under capillary microscopy (Lombard, 1912), the vaso-dilator effect of histamine upon the capillary endothelium (Dale)—all these are tied

<sup>20</sup>A. Grollman: *Am. J. Physiol.*, 1929, XC, 210. Cited by Leake.

up with mooted questions in recent physiology which would lead us too far. Concerning the question of chemical activation of cardiac muscle by carbohydrates or  $\text{CO}_2$  or of vaso-dilation by histamine and of vaso-constriction by adrenaline, d'Irsay cites the dictum of Langendorff (1884): "The cells are activated by their own vital products" (*Das Lebensprodukt der Zelle ist ihr Erreger*).

These advances in the physiology of the circulation were not without their effect upon our knowledge of its disorders. In the first half of the 19th century, however, physicians were occupied largely with valvular murmurs, in consequence of the novelty of auscultation by the stethoscope and the refinements in physical diagnosis exploited by Laennec, Bouillaud and Skoda. Laennec, himself, was occupied mainly with the respiratory system and did little for heart disease. He followed his teacher, Corvisart (1806), in stressing the myocardium as "the key to cardiac pathology." Corvisart revived palpation (Albertini) and percussion (Auenbrugger) and, in his treatise on heart disease (1806), reported cases of endocarditis and tricuspid stenosis, and first described sclerosis of the pulmonary artery. Laennec described toxic febrile myocarditis, fatty degeneration of the myocardium and dissecting aneurism (Nicholls, 1760). His greatest contribution to the subject was, of course, the stethoscope, with which he noted some of the physical signs of pericarditis (Senac, 1749). Rheumatic pericarditis was described by Andral (1829), and the association of pericarditis with chorea was noted by Richard Bright (1839). Griesinger (1856) described chronic adhesive mediastino-pericarditis, with the characteristic intermittent pulse during respiration (*pulsus paradoxus*, Kussmaul, 1874). Endocarditis, first described by Corvisart (1806) and Andral (1829), was named by Bouillaud (1836) and was largely his creation. As early as 1788, endocarditis was correlated with acute rheumatism by David Pitcairn, in his lectures at St. Bartholomew's Hospital, but he left no record, beyond the testimony of the elder Latham and Matthew Baillie, and Jenner's contribu-

tion of July 29, 1789, was also lost (H. B. Jacobs). The textual record begins with W. C. Wells' paper of 1812 and the subject was developed *in extenso* (law of coincidence) by Bouillaud (1836-40). Malignant endocarditis was noticed, but not recognized as such, by Corvisart (1806), Hodgson (1815) and Bouillaud (1836), and was first described by Senhouse Kirkes (1852). The chronic subacute form (endocarditis maligna lenta) was first mentioned in Osler's Goulstonian Lectures (1885) and was described by Osler and Horder (1909). Subacute bacterial endocarditis (Barlow and Rees, 1843) was established by Libman and Schottmüller (1910). Up to 1840, cardiac aneurism was confused by the earlier writers with myocardial hypertrophy and dilatation. Genuine cases were seen by Galcati (1751) and Matthew Baillie (1818), but the matter was first clarified by Thurnam (1838) and Wickham Legge (1840-83). Cardiac hypertrophy was first correlated with renal disease by Richard Bright (1827-36). The effect of physical overstrain was emphasized by Hope (1839), Peacock (1864) and Clifford Allbutt (1870-1909). DaCosta's irritable heart in soldiers (1862-71) was confused with the D. A. H. of the World War, which resolves itself into the "effort syndrome" of Lewis (1917). Fatty myocardial degeneration was first correlated with Cheyne Stokes respiration (1816) and with heart-block with slow pulse (Stokes Adams syndrome, 1827-46) by Stokes (1854). Alcoholic dilatation and hypertrophy was recognized by Allbutt at Leeds (1871) and described by Graham Steele (1893). Congenital malformations of the heart were first noticed by Senac (complete absence of interventricular septum, 1749) and Morgagni (pulmonary stenosis, 1761), and were investigated by Bouillaud (1835), Peacock (1858), Rokitansky (1875), Sir Arthur Keith (1906) and Maude Abbott (1908). Bouillaud attributed them to arrested development and foetal endocarditis. Keith found most of them to be due to arrested development of the bulbus cordis. The cyanosis was attributed by Senac to admixture of arterial and venous blood, by Morgagni to venous stasis. Partially defective septum without cyanosis was described

by Roger (1879) and called after him (*maladie de Roger*). Experience of the World War seems to confirm the view of Laennec and Rokitansky that congenital heart disease (cyanosis) is antagonistic to tuberculosis (Rolleston).

Of the valvular diseases, mitral regurgitation was known to Morgagni (1761), mitral stenosis, aortic regurgitation and aortic stenosis were described by Vieussens (1715), tricuspid stenosis by Crüwell (1765), Morgagni (1769), Corvisart and others, and tricuspid incompetence by Lancisi (1728). The physical signs of these lesions were correlated mainly by James Hope (1832-9), who established the cause of the heart sounds by vivisection, and made a thorough investigation of the pathology of mitral incompetence. Hope's diastolic murmur in mitral stenosis (1832) and his "jerking pulse" in aortic regurgitation (1839) were memorable eponyms in their day. Notable descriptions of aortic incompetence were those of Thomas Hodgkin (1829) and Corrigan (1832). The presystolic murmur was described by Austin Flint (1862-86). Operative treatment of mitral stenosis was proposed by Lauder Brunton (1902), tested experimentally by Cushing and Branch (1908) and done on man by Cutler (1923) and Souttar (1925). Aortitis was described by Morgagni (1761) and Virchow (1847); coarctation of the aorta by Paris (1789), Laennec (1826), Reynaud (1828), Peacock (1866) and Bonnet (1903). Arteriosclerosis was found by Sir Armand Ruffer in Egyptian mummies 3000 years old (1911), was noted in Harvey's second epistle to Riolanus (1649), was named by Lobstein (1833) and elucidated as an inflammatory process by Bouillaud (1824) and Virchow (1847). Arterio-capillary fibrosis, with occasional impact on the kidneys, was described by Gull and Sutton in 1872. The pre-albuminuric stage was described by Mahomed in 1879. The term "atherosclerosis" was introduced by Marchand (1904), to indicate that the initial process is degenerative, rather than inflammatory. Pseudo-arteriosclerosis during Bright's disease was described by Moschcowitz (1928), thrombo-angiitis obliterans by Buerger (1908).

Essential, non-renal high blood-pressure (hyperpiesia) was described by Clifford Allbutt (1895) and shown to be productive of arteriosclerosis in the elderly. Syphilitic arteritis was described by Allbutt (1868), Heubner (1874) and Barlow (1877). Cyanotic polycythæmia was described by Vaquez (1892) and the splenomegalic form by Osler (1903). The form associated with sclerosis of the pulmonary artery and terminal failure of the right heart was called *cardiacos negros* by Ayerza (1901) and described as Ayerza's disease by Arillaga (1913).

The classical account of angina pectoris is that of Heberden (1768), who reported 20 cases, gave the disease its name, and by 1801, had seen 100 cases. Seneca's epistles to Lucilius record his sufferings from the condition, which ended John Hunter in 1793. Hunter's case was diagnosed by Jenner (1777), who, with Hunter, first associated angina pectoris with obstruction from hardening of the coronary arteries (1776). In the view of Allan Burns (1809), this produces an anæmia (anoxæmia) of the cardiac muscle, such as obtains in the intermittent claudication of Bouley (1831) and Charcot (1858). That the lesion is in the base of the aorta was maintained by Corrigan (1837) and sustained by Allbutt (1894) and Wenckebach (1924). Amyl nitrite therapy was introduced by Lauder Brunton (1867), cervico-thoracic sympathectomy by Jonnesco (1916) and peri-arterial sympathectomy by Leriche (1917-22). The detailed history of angina pectoris has been carefully analyzed in Rolleston's *Harveian Oration* (1928). Cardiac asthma was differentiated from angina pectoris by Heberden (1768) and first clearly defined by Sir James Mackenzie (1911). Coronary thrombosis, first noted by Harvey in his second disquisition to Riolan (1649), was described in detail by Obrastzon (1910), J. B. Herrick (1912), Parkinson and Bedford (1928). Heart-block with slow pulse (Stokes-Adams syndrome) was first observed by Morgagni (1761) and was described by Heberden (1768), Andrew Duncan (1793), Adams (1827), Bright (1831) and Stokes (1846). Physiological heart-

block was noted by Harvey (1628) and elucidated by Gaskell (1882). Stokes-Adams disease became generally known in practice through the writings and teachings of Osler (Rolleston). Exophthalmic goitre was described by Parry (1786-1813), Flajani (1800), Graves (1835) and Basedow (Merseburg triad, 1840).

Pulse-counting by the watch, introduced by Floyer (1707-10), was as he predicted, ignored for a century or more, even by Corvisart (1808), and first came into its own at the hands of Stokes, Graves and Corrigan. Parry published an experimental study of the pulse in 1816. Hope analyzed the pulse in 10,000 patients with valvular disease (1831) and Mackenzie studied it with the polygraph (1892), after which, less importance was attached to cardiac murmurs (Rolleston). Mackenzie distinguished *pulsus alternans* and *pulsus irregularis perpetuus* (1902) as a "nodal rhythm" (1907). In 1910, this pulse was shown by the electrocardiograph to be associated with the auricular fibrillation of Cushing and Edmunds (1901-6). Auricular flutter was produced experimentally by MacWilliam (1887) and elucidated clinically by Sir Thomas Lewis and others (1920-21). Ventricular fibrillation was produced experimentally by Ludwig and Hoffa (1850) and Kronecker (1884) and was described as a cause of sudden death by MacWilliam (1889). Paroxysmal tachycardia was described by Cotton (1867), Carl Gerhardt (1881) and Bouveret (1889). The science of the cardiac arrhythmias, including analysis of the effects and dangers of digitalis and quinine in auricular fibrillation, was developed mainly by telegrams from the heart (string-galvanometer) and was largely the work of Mackenzie, Lewis and Wenckebach. Digitalis was first described by the medical botanist, Leonhard Fuchs (1542), was introduced as a diuretic in dropsies by Withering (1775-83) and as a cardiac sedative by Cullen (1789) and John Ferriar (1799), who first noticed that it slows the pulse. Sahli showed that therapeutic doses in man do not raise the blood-pressure (1901). Mackenzie (1910) and Cushing (1925) dispelled current

fears as to its use in heart-failure. In like manner Wenckebach (1914), Lewis (1922) and others showed that quinine and other cinchona derivatives will restore the rhythm in auricular fibrillation and flutter, if so administered that the Keith-Flack pace-maker may gain control without poisoning of the myocardium (ventricular fibrillation).

Aneurism was the starting point of the brilliant developments of surgery of the vascular system, from Antyllus to Carrel. At the end of the 18th century, the theory of syphilitic origin of aneurism, although upheld by Lancisi and Morgagni, was ignored, even by Matthew Baillie, and although revived about 1850, was really confirmed by the presence of the Schaudinn spirochæte (1905) and the Wassermann reaction (1906). Arterio-venous aneurism was described by William Hunter (1757). Dissecting aneurism was discovered in the body of George II by Frank Nicholls (1760), whose findings were confirmed by Laennec, Peacock and others. Embolic aneurism was described by W. S. Church (1870) and Ponfick (1873), and its congener, periarteriitis nodosa, by Kussmaul and Maier (1866). In the 18th century, treatment of aneurism by the Valsalva rest-starvation cure, with light bloodletting (*supra*), was the most popular and was revived (without venesection) by Tufnell (1874). Attempts at coagulation by exhibition of iodide of potassium (Nélaton, 1859), gelatine injections (Lancereaux, 1897), wire coils (Bacelli) and coagulene (Kocher-Fonio) followed. John Hunter's ligation of the femoral artery for popliteal aneurism (1786) was repeated by his American pupil, Wright Post (1796), who was also successful in tying the common carotid (1813), the external iliac (1814) and the subclavian (1817). John Abernethy was successful in two ligations of the external iliac out of four (1796-1809). John Bell ligated the gluteal artery in 1801. Astley Cooper was the first to ligate the carotid with success (1808) and even essayed ligation of the aorta (1817). His pupil, Valentine Mott, did more successful ligations of great vessels than perhaps any other surgeon, notably of the innominate

(1818), the common iliac (1827), the external iliac (1831), the right subclavian (1833) and the internal iliac (1837). Mott's account of Cooper's attempt to ligate the subclavian, on August 20, 1809, reveals the fact that opium was frequently given in massive doses to stupefy and quiet the patient during these difficult and dangerous procedures. Up to the introduction of ether and chloroform anæsthesia (1847), there was a remarkable run of bold operating on the great vessels. Thus, the external iliac was tied by Dorsey (1811), Goodlad (1811), Soden (1816), Cole (1817), Dupuytren (1827), Jameson (1821), Aston Key (1822), White (1827) and Peace (1841), the subclavian by Colles (1811-13), Dupuytren (1819), Aston Key (1823) and Rodgers (1846), the innominate by the elder Graefe (1822), the common iliac by Bushe (1830) and Peace (1843); while, with the aid of anæsthesia, we find such feats as successful and simultaneous ligation of the external and common iliac, the femoral and the profunda by Gurdon Buck (1858), the common, external and internal iliac by Syme (1862), the left subclavian, common carotid and vertebral by Willard Parker (1864). The most remarkable feat of this kind was the ligation of the innominate, common carotid and right vertebral arteries for subclavian aneurism by Andrew W. Smyth, of New Orleans (1864), with exhibition of the living patient in 1869. The specimen can be seen in the Army Medical Museum (Washington). With the introduction of antisepsis came the innovations of Lister (1869-80), Halsted's method of occluding the great vessels by a metal band (1909), Murphy's experiments on end to end suturing (1896), arteriorhapy (Matas, 1903) and the most important of all, Carrel's substitution of vascular anastomosis for the older methods (1902-7) and his experiments on transplantation of blood-vessels (1909). Suture of the heart was first done by Farina (1896) and Cappelen (1896) and successfully by Ludwig Rehn (June 8, 1896). Cardiac surgery is now a well established procedure.

There are two important therapeutic devices which owe their origin to Harvey's demonstration, namely transfu-



sion and hypodermic medication. Transfusion, first essayed in animals by Richard Lower (1665) and in man by Jean Denys (1667), Lower and King (1667), went out of fashion, as Rolleston says, for a long time thereafter. It did not come into practice again until the period 1818-76, after which it again went into abeyance until it acquired a scientific status through the improved technique of Crile (1909) and Landsteiner's work on blood-grouping and its consequences (1899-1901). Intravenous medication in animals was attempted by Christopher Wren (1656) but hypodermic injection came in with the invention of the needle syringe by Rynd (1845), and its improvement by Pravaz (1851). Morphine injections in heart disease were first recommended by Sir Clifford Allbutt (1869).

Even the most superficial survey of the history of the circulation and its consequences will convince any fair-minded observer as to the superiority of Harvey's experimental proof over the summary of Cesalpinus, whose speculations were, to some extent, anticipated by the Spanish anatomists who preceded him. Had investigation stopped where Cesalpinus left it, knowledge would have remained at a standstill. The outcome of Harvey's demonstration covers many of the most important advances made in recent medicine and does but confirm his position as the founder of modern experimental physiology and as one of the great leaders of European thought.

FIELDING H. GARRISON.

# RECENT CONTRIBUTIONS IN DISEASES OF THE THYROID AND DIABETES\*

By WALTER W. PALMER

The contributions to the field of metabolism in recent years have been many; some of real service to the practicing physician and a few of the greatest importance to both the physician and the physiologist. In the realm of the hormones and special food products operative in metabolic disturbances, the past two decades have witnessed an advance in our knowledge of the chemistry and physiology of these vital substances greater than in any similar period. An enumeration of some of the outstanding developments is truly impressive; insulin for diabetes, thyroxin for thyroid insufficiency, parathormone for parathyroid tetany, the sex hormones, adrenal cortex extract, liver extract for pernicious anemia, and vitamins for the deficiency diseases. The significance of the minerals in relation to nutrition in general and special functions has been made more certain. Much light has been shed on the complicated mechanism of electrolyte balance in nephritis, diabetes, and intestinal disturbances. We are informed that manganese is necessary for mother love! All of us should take pride in the fact that the advance in the several fields has been due to a considerable extent to the work of men in the United States and Canada.

The literature for the period comprises thousands of articles, many monographs and books. A comprehensive review would be quite impossible in a short paper. It is proposed in this communication to mention briefly some of the recent work in thyroid disease and diabetes mellitus.

## DISEASES OF THE THYROID GLAND

For the practitioner, probably, the most useful contributions to the thyroid problem during the past twenty

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years are the introduction by Benedict (1) of an apparatus for the determination of basal metabolism adapted to clinical needs and the revival of the use of iodine by Plummer (2) for the temporary control of thyrotoxicosis. Today most hospitals and many physicians' offices are equipped with some sort of a simple machine to estimate basal metabolic rates and it is rare now to discover an individual who is subjected to thyroidectomy without first receiving iodine in some form, usually as Lugol's solution. From a practical standpoint progress in the field during the past two or three years does not compare in importance. No discussion of the subject is possible without the mention of the isolation of thyroxin by Kendall in 1919 and the brilliant work of Harrington (3) in the simplification of the method of extraction and in presentation of the evidence of its chemical constitution culminating finally in synthesis of the product by Harrington and Barger (4). The crucial test has shown that the synthetic compound is physiologically active (5). Thyroxin is the p-oxydiiodophenyl ether of diiodotyrosine. Of further interest in the relation of diiodotyrosine to the constitution of thyroxin is the isolation by Harrington and Randall (6) of diiodotyrosine from the thyroid gland. The connection between this substance and thyroxin would seem to be important.

### *Deficiencies of the Thyroid Gland*

The literature up to 1929 on the rôle of iodine in nutrition with special reference to the incidence of goitre has been admirably reviewed by Orr and Leitch in a special report published by the Medical Research Council, England (7). In America, McClendon and Hathaway (8) have shown the higher incidence of goitre in areas where the iodine content of the water and food-stuffs is low. Similar observations have been made by von Fellenberg for Switzerland (9) and Hercus and collaborators (10) for New Zealand. Furthermore, it has been demonstrated by Marine and coworkers (11) and Silberschmidt (12) that the administration of iodine in the goitre areas is

followed by a marked decrease in incidence of goitre particularly among school children. A recent report from Orr (13), England, is not in entire agreement with previous work in that no definite correlation between the incidence of goitre and iodine low areas could be established. Orr is of the opinion that while the administration of iodine appears to prevent the development of goitre the question of whether iodine deficiency is the sole cause of the disease is an open question. In this connection experiments reported by McCarrison and Newcomb (14) are of interest. These workers find that rats fed a low iodine diet markedly deficient in vitamin A do not develop goitre when kept meticulously clean but under less sanitary conditions develop goitres which can be prevented by the addition of iodine to the food.

That iodine deficiency may not be the sole factor in the production of simple goitre receives further support in the significant observations of Webster, Chesney and Marine (15). A substance in cabbage, particularly winter cabbage, not extractable by water, heat, acid and alkaline stable produces goitre of extraordinary size (400 times normal size), in rabbits. An excess of iodine added to the food, however, will prevent the development of the goitre. On the other hand large doses of iodine administered after the goitre is developed produces a rapid involution, increased metabolism, wasting and death, a true picture of hyperthyroidism. It may be mentioned here that we have found in our thyroid clinic at the Presbyterian Hospital that children and young adults with simple goitre with few exceptions are little benefited by the administration of iodine. This seems to be contrary to the experience of physicians in the low iodine areas who report that usually iodine administration is followed by the diminution of the size of the gland.

Shortly after Kendall isolated thyroxin Boothby and associates (16) reported that the physiological activity of the hormone was essentially equivalent to the whole gland. There was, however, a delay in the effect over that

of whole gland. Quantitative relationships indicated that one milligram of thyroxin raised the basal metabolism of the average individual two per cent. The effectiveness of the hormone appeared to be the same as the whole gland. From time to time clinicians have expressed some scepticism of the validity of this view and recently experiments which bear on the subject have been reported. Gaddum (17) using rats as test animals finds that thyroglobulin is much more effective in increasing oxygen consumption than is thyroxin when compared to their iodine contents. Employing the rat test method of assay Cameron and Carmichael (18) find that natural and synthetic thyroxin exhibit the same degree of activity but this is not as great as thyroid gland itself when compared on the basis of iodine dosage.

Another difference between thyroxin and whole gland is reported by Abelin (19) who finds the change of carbohydrate to glycogen in the liver is impaired to a great degree after the administration of the former. The physiological differences between thyroxin and whole gland reported seem to have considerable support. It is believed that the hormone is not utilized in the organism in its isolated form but probably as thyroglobulin. Schulhof (20) was not able to demonstrate thyroxin in the blood and lymph vessels of the thyroid gland but did find thyroglobulin. In practical therapeutics it would appear that thyroxin has little advantage over the whole gland, perhaps some disadvantages. In any event it is far more expensive. Difficulty still exists in the assays of thyroid gland preparations. The U.S.P. standards are based on organic iodine content. Harrington (21) has recently shown that the amount of thyroxin in commercial preparations does not always parallel the iodine content and urges therefore that the preparations for therapeutic use be assayed by determining the thyroxin content rather than the iodine. Biological assays are treacherous. Perhaps the one most generally accepted, the acetronitrile test proposed by Hunt, is the most reliable. Recently Morch

(22) has suggested utilizing the effect of thyroid preparations on gaseous metabolism of mice as a method of assay. The method has a large error and is time consuming. It would seem that the chemical assay suggested by Harrington offered the best possibilities, provided the quantitative results are dependable and the activity of the gland is due solely to its thyroxin content.

Since the determination of the basal metabolic rate has been made easy, there have appeared an increasing number of reports (23) (24) (25) of cases with low basals without the clinical manifestations of myxedema. Although these cases are considered to be suffering from hypothyroidism there are several features which may be overlooked. Dubois (26) and Rabinowitch (27) call attention to the large errors which may creep into the determination itself as well as its interpretation. It should be remembered that the Aub-Dubois standards are too high for many individuals; trained subjects give more reliable results than untrained, muscular tone and the activity of the individual before the determination, the state of nutrition, temperament and previous dietary, all may influence the value. Undoubtedly some of the cases described seem to be benefited as the result of thyroid administration, their basals return to within normal limits, they are clinically improved and quite properly may be suspected as suffering from thyroid insufficiency. Koehler (28) suggests an interesting differentiation in the patients he observed. He calls attention to the frequency within this group of symptoms of languor, fatigability, asthenia, restlessness and nervousness. Some of these patients with low basals are suffering from thyroid insufficiency, others from insufficiency of the adrenals. The former are usually overweight, with low blood pressure, sluggish, low respiratory curve (observed when determining the basal metabolic rates) insensitive to anoxemia, adrenalin and histamin, and improve on the exhibition of thyroid extract. The latter are thin, also with a low blood pressure, hyperactive, the respiratory curve

erratic, sensitive to anoxemia, adrenalin and histamin, and improve on the administration of adrenal extract. Unfortunately for the present adrenal extract is not available for general use, and as yet no confirmation of his observations has appeared. The recent work of Swingle and Pfiffner (29) who have succeeded in obtaining an extract of the adrenal cortex capable of maintaining adrenalectomised cats in a normal state indefinitely is encouraging. Not only may there be available an extract of adrenal gland effective in the milder insufficiencies, if there be such, but also in true Addison's disease as suggested by the report of Rowntree and associates (30) who apparently have prolonged the life of several cases of this disease.

The association of obscure secondary anemias with low basal rates has been observed by Mackenzie (31). In the cases he reports the rapid return of the hemoglobin and red blood corpuscle count to normal after the ingestion of thyroid gland in the absence of other hematinic measures would indicate that hypothyroidism played an important rôle in the production of the anemia in cases under discussion.

### *Graves' Disease*

In spite of the vast amount of study and investigation of Graves' disease, for the present the etiology of the condition remains as obscure as ever. The disease as it exists in man has not been produced in animals. The most suggestive approximation is the familiar cat experiment of Cannon, Binger and Nye (32) who fused the right phrenic to the right cervical sympathetic nerve resulting in marked tachycardia, diarrhoea, falling hair, excitability, an increased basal metabolism and in one cat an exophthalmos on the side of the fusion. Investigators have had difficulty in repeating these experiments. Marine's (33) experiments would indicate that the adrenal cortex may play a rôle in the production of the picture. Injury to the cortex in cats and rabbits with the thyroid intact is followed by increased metabolism, increased appetite, irritability, hypersusceptibility to drugs associated with a hyperplasia

of the thyroid gland, thymus and lymphoid tissue. While the view that Graves' disease is essentially a disease of the thyroid gland still prevails Marine is of the opinion that the adrenals and possibly the sex glands may play an important part in its causation. Certain it is that many of the symptoms of the disease may be produced temporarily by feeding thyroxin or the gland and the evidence available indicates that in Graves' disease the thyroid gland instead of storing thyroglobulin to be utilized as is needed under normal conditions cannot prevent the hormone from flooding the system. Using von Fellenberg's method for the determination of organic iodine in the blood Lunde (34) and assistants find markedly increased amounts of organic iodine in the blood of patients with Graves' disease. After operation or the administration of Lugol's solution the organic iodine values approach normal. Other observers report similar results. Gutman, in my clinic, has spent a year working with the method used by Lunde and has come to the conclusion that the method is not only time consuming and laborious but not altogether reliable. Provided Lunde's results have any significance they would favor the supposition that the increase in organic iodine in the blood of patients ill with Graves' disease is circumstantial evidence that there is an increase in thyroxin in the circulation. Attempts to increase the hormone output of the thyroid gland by stimulating the peripheral end of the cervical sympathetic, the intravenous injection of adrenalin and pilocarpin and massage of the gland have failed in the hands of Hektoen, Carlson and Schulhof (35).

Although a clear cut physical basis for the etiology of the disease is lacking, the association of some psychic trauma in a constitutionally susceptible individual with the onset of symptoms has long been recognized by clinicians. This relationship has been discussed recently by Moschcowitz (36). A detailed study by Dr. Conrad of the psychiatric patterns of Graves' disease patients in the clinic at the Presbyterian Hospital records striking similarities. Mother child conflicts, sexual maladjustments



and the sense of being overburdened appear with great frequency in the histories.

The hypothesis has been advanced that in certain of the cases of thyrotoxicosis the thyroid gland elaborates a pathological secretion which produces the symptoms. Formerly Plummer suggested that true Graves' disease might be due to an incomplete iodizing of the hormone while in patients with nodular glands toxic symptoms were probably caused by the over-production of the normal active principle. The evidence in support of this view is not at present entirely convincing. Recent pathological studies (37) and clinical experience would indicate that there is little difference fundamentally between the toxicosis encountered in the so-called simple hyperplastic gland or primary Graves' disease and the nodular thyroid gland or secondary Graves' disease. The difference in clinical behavior is more probably due to the stage of the disease (33). Williamson and Pearse (38) suggest the existence of two functions of the thyroid gland, a secreting function and an iodocolloid function. The secretory activity is believed to be related to thyrotoxicosis for this condition is ameliorated by simple removal of pure secreting tissue. Iodocolloid is considered to have only an indirect relation to the thyrotoxicosis. The behavior of the gland following the administration of iodine in their opinion supports this view since we may continue to get toxic symptoms in the presence of iodocolloid reserve in the gland. By stimulating normal thyroid glands Ludford and Cromer (39) observed the Golgi apparatus to increase in size, secretion droplets appear, enlarge and make their way into the colloid material. In hyperthyroid glands, however, the secretion makes its way directly into the capillary. Because of the probability that normal iodocolloid is composed of two types of secretion the authors consider the facts described above as presumptive evidence in favor of a qualitative difference in the secretions of the thyroid gland in exophthalmic goitre.

Although in diagnosis little difficulty in the average case

may be encountered many so-called border-line cases often present perplexing problems. These situations are most frequently seen in individuals of the psychoneurotic type. Since the introduction of the basal metabolism test perhaps too much reliance is placed in this single bit of evidence. Probably many clinicians have seen cases similar to those published by Strouse and Binswanger (40) in which there is a symptom complex resembling hyperthyroidism without increased basal metabolic rates. These patients complain of vague gastro-intestinal symptoms, dizziness, sleeplessness, lack of energy, palpitation, excitability, headaches and vasomotor disturbances. They seldom exhibit exophthalmos, may or may not have an enlarged thyroid gland, usually have a distinct tremor of the fingers and tachycardia. The basal rates are within normal limits. The picture resembles closely that seen during the war designated as effort syndrome or neurocirculatory asthenia. Many of these cases seem to be strikingly benefited by the administration of iodine in therapeutic doses without any influence on the basal metabolism. In view of the large psychoneurotic element in these individuals conclusions must be drawn with caution. An ingenious suggestion in the differentiation of these cases has been made by Dresel and Goldner (41) (42) supported by Willis and Mora (43). These authors find that under the conditions of their experiment the injection of serum from thyrotoxic patients impairs the glycogenic function of the livers of mice to a greater degree than does normal serum. Since the pathological serum is from 50 to 100 times as effective as might be expected on the basis of its thyroxin content, these authors believe there is some substance other than thyroxin operative. The protagonists of the hypothesis that pathological glands secrete a qualitatively different secretion might consider this evidence as further support of their contention. The test takes about 80 hours to complete, is fairly simple and the proposers believe has useful possibilities as a biological test in borderline cases, for the study of the thyrotoxicosis in humans and for controlling experimental hyperthyroidism.

*Treatment*

So far as treatment of the thyrotoxicosis is concerned the belief that no matter how carried out, skillful neglect, iodine, X-ray or surgery, the course of the disease is seldom less than three or four years, is probably not far from correct. The predominant view, however, is that in properly selected cases the one form of treatment which offers most relief to the patient with early return to economic stability and social activity is subtotal thyroidectomy at the hands of a competent surgeon. The introduction of the use of iodine in preparation for operation and post-operative control constitutes the most significant advance of the past few years. Certainly in middle life and the elderly, surgery, where possible, with prompt relief to the cardiovascular system would seem to be the wisest course in treatment. It has been amply demonstrated now that the use of iodine in the nodular glands is as safe as in the primary Graves' cases although frequently its effect is not so striking (33) (44). When the spectacular temporary effects of iodine were first observed the hope to do away with surgery was entertained. Prolonged treatment with small doses (45) and interrupted administration of iodine has proved effective in controlling the symptoms in a few mild cases (46). For general use it has proved disappointing, since in most cases after the first two or three weeks of ingestion with the extraordinary subsidence of symptoms there is a gradual return to the initial state. Although 1 c.c. or more of Lugol's solution is the conventional daily dose Thompson and associates (47) have shown that extremely small doses, one drop of Lugol's solution corresponding to 6 milligrams of iodine daily will produce a marked beneficial effect on the symptoms and lower the basal metabolism. This author suggests that only five drops of Lugol's solution daily produces the optimum effect and is all that is necessary in preparation for operation. The impression that once iodine has been used in the medical treatment of a case of thyrotoxicosis, it is never so effective again, in the event its use is needed in preparation for operation, in the author's experience, has no basis in fact. In our clinic at the Presbyterian Hospital there have been several

opportunities to observe the beneficial effect in cases having received iodine over long periods but after a month to six weeks without iodine a re-exhibition of the drug resulted in the desired effect. In this connection may be mentioned some studies Palmer, Sloan and Carson (48) have made on the effect of iodine on the excretion of creatin in cases of thyrotoxicosis. Iodine administration is followed by a prompt (3-7 days) reduction in the excretion of creatin, indeed, in many cases, it disappears altogether from the urine. Cases which we have had the opportunity to study and have previously taken iodine over long periods if allowed to rest without the drug for several weeks respond so far as the creatin excretion is concerned as do the untreated cases. Occasionally the behavior of the creatin is independent of the change in the basal metabolism.

The possible effect of vitamines A and D on the utilization of iodine in Graves' disease is suggested by Adamson and Cameron (49) and confirmed in part by Rabinowitch (50) who find that vitamines A and D plus iodojecoic acid is as effective as Lugol's solution in producing subjective improvement and lowering the basal metabolism, while if the vitamines and the iodised fatty acid are used separately no such effect is obtained. Himwich and co-workers (51) report increased appetite in hyperthyroidism produced experimentally in dogs as the result of feeding vitamine B, suggesting that the amount of vitamine B required is determined by the caloric needs. The experiments suggest possible improvement in dietary measures so essential in the care of patients ill with Graves' disease.

When ergotamine became available commercially many reports appeared in the literature advocating its use in the treatment of Graves' disease. For the first time a drug was at hand which would depress the sympathetic. The results have been disappointing and so far as the author is aware this drug has little place in our management of Graves' disease. Those interested may refer to the recent article by Youmans and Trimble (52) who have reviewed the literature.

Attempts to influence Graves' disease by the administration of antithyroglobulin sera have been unsuccessful. Schulhof (53) recently reports no influence on the basal oxygen consumption in rats when thyroglobulin and antithyroglobulin are injected simultaneously.

The most suggestive possibility of an addition to our medical equipment in the treatment of Graves' disease comes from Marine's laboratory. The effect of injury of the adrenal cortex on the thyroid gland immediately suggested the use of adrenal gland in the treatment of Graves' disease. In 1921 and 1924 Marine and Shapiro (54) reported 20 cases of Graves' disease treated with glycerol extract of fresh ox adrenal cortex. A striking improvement was observed within twelve to fifteen days. There was gain in weight and strength, a disappearance of diarrhœa, and definite fall in the basal metabolic rate, the latter approaching normal within two to four months. Recently Marine, Bauman and Webster (55) report that the same general results have been obtained by this method in 50 additional cases.

With the advent of Swingle's potent adrenal extract a few cases have been treated by Harrop, of Baltimore, and Rowntree, of Mayo's Clinic, with intravenous administration (56). Certain of the cases have responded with a marked drop in the basal and some improvement subjectively. Others, more in number, have shown no effect. The few cases the writer has observed have shown no significant benefit after the intravenous administration of the extract.

### DIABETES MELLITUS

Since the introduction of insulin by Banting and its isolation in crystalline form by Abel and associates (57) nothing comparable has been contributed to the subject of diabetes. A vast amount of work has been reported on the physiology of insulin and carbohydrate metabolism which cannot be reviewed here. An excellent summary of the literature with a bibliography of 456 papers selected from a total of 3000 by Cori (58) has appeared within the past month. He briefly summarizes the discussion in his 100 page

article in the statement: "the increase in the rate of oxidation of blood sugar in the tissues and of conversion of blood sugar to muscle glycogen and inhibition of hepatic glycogenolysis seem to be well established effects of insulin." The problem of whether any or all of these effects are basic remains unsolved.

Several attempts have been made by Murlin (59) and others to overcome the difficulties and inconveniences of subcutaneous administration of insulin by giving it by mouth but without significant success. Insulin precipitated by phosphotungstate when administered by mouth has been shown by Mukherjee (60) to lower blood sugar and he believes it effective in the treatment of diabetes. Flasch (61) mixes insulin with saponin and finds the mixture effective by mouth although its action is delayed twelve hours. Recently Steinitz (62) reports a diminution of blood sugar and glycosuria experimentally by mouth administration of cholinsulin which is an addition compound of deoxycholic acid and insulin. Its use practically proved disappointing. The ease with which insulin is destroyed in the gastrointestinal tract and variability in absorption are obstacles difficult to surmount in developing any method for using the hormone by mouth. Collip (63), Best and Scott (64) and Kaufmann (65) have isolated from yeast and various vegetables and plants an insulinlike substance known as "Glukouin" but no practical use for it has been discovered.

Many attempts to introduce insulin substitutes, products that may be taken orally have met with little success. One having the greatest vogue for a time perhaps was synthalin, a guanidine derivative proposed by Frank, Nothmann and Wagner (66). Bischoff, Sahyun and Long (67) made 25 different compounds of guanidine having hypoglycemic properties which are closely related to lethal doses and toxic effects. Numerous clinical reports have appeared at first favoring the use of guanidine derivatives but later giving them up because of the damaging effect on the liver and kidneys. The toxic effects are discussed by Karr, Belk and Petty (68). The blood sugar lowering effects obtained with

"Glukhoment," a pancreas autolysate proposed by von Noorden (69) has been shown to be due to guanidine action by Bischoff, Blatherwick and Sahyun (70) and Langecker (71). Galegine, isolated from *Galega officinalis* by Tanret (72) and studied by Müller (73); Myrtillin, extract of blueberry leaf proposed by Durig, of Vienna, because of its use for diabetes by the Alpine peasant, isolated by Wagner and associates (74) and championed clinically by Allen (75); extracts of Rhizomes (76) and liver extracts (77) have been proposed as insulin substitutes but have gained no ground clinically.

Perhaps the development most appreciated by both physician and patient is change in attitude toward the use of carbohydrate in cases requiring insulin. The influence of the period of low carbohydrate, high fat under-nutrition diets introduced by Allen persisted for several years after the appearance of insulin. As experience with the use of insulin increased it became apparent that certain individuals on a low carbohydrate high fat diet required amounts of insulin far beyond theoretical calculations. The first case (under Dr. Ladd's care) coming to the writer's attention eight years ago is a striking example. A 47 year old hotel clerk entered the Presbyterian Hospital July, 1923, with a history of diabetes of five years' duration. Previous to admission efforts to control the glycosuria had resulted in a loss of over 100 pounds for his diet had to be restricted to carbohydrate 60 grams, protein 80 grams, fat 100 grams in order to keep him sugar free. His weight was 40 kilograms on entrance to the hospital. The diet and insulin were increased until for nearly four months he was taking carbohydrate 110, protein 75, fat 250, 3270 calories, requiring 180 units of insulin which did not keep him entirely sugar free. On this regime he gained eight kilos but improved little in strength and sense of well being. For the succeeding four months he was given a diet of carbohydrate 140 grams, protein 70 grams, fat 160 grams, calories 2349, which required 150 units of insulin to keep him sugar free but during this period he lost 2.5 kilos. Following Dr. Geyelin's

suggestion a radically transposed diet of carbohydrate 250 grams, protein 75 grams, fat 100 grams, calories 2200 and 105 units of insulin resulted in regaining the lost 2 kilos within 6 weeks. On this diet he doubled his hospital entrance weight during the year following discharge, and was able to resume nearly normal activities. With this high carbohydrate low fat, slightly under maintenance diet and sufficient insulin to keep him sugar free he remained well until July 1926 when he died suddenly probably of a coronary occlusion. Since Geyelin's (78) observations several reports favoring the high carbohydrate low fat diet have appeared (79) (80) (81) (82) (83). Notwithstanding the success of Newburgh and Marsh (84) with high fat diets in the treatment of diabetes in the pre-insulin days there already existed evidence against this onesided diet in the work of DuBois and Geyelin (85) who found great difficulty in maintaining nitrogen equilibrium in diabetics taking a low carbohydrate high fat diet. This fact probably explains in part the gain in weight and strength of the patient taking a much lower caloric diet when the carbohydrate intake is  $2\frac{1}{2}$  times the fat.

Recently Dr. Geyelin (86) has assembled the results of treatment of some 200 cases of diabetes including children and adults. Some of his patients came under observation before the days of insulin and constitute excellent controls. On diets adjusted so that the carbohydrates in grams amount to  $2\frac{1}{2}$  to 3 times the fat with adequate protein for the age of the individual, normal growth occurs in children and in all the blood cholesterol can be maintained within normal limits. The blood sugar tends to be lower. The increase in carbohydrate, up to 20 grams, utilized per unit of insulin is quite remarkable when compared with 2 to 5 grams on the high fat low carbohydrate arrangement employed formerly. The calories can be fixed at any level deemed wise to keep the weight within desirable bounds. Since high blood cholesterol is considered to favor the development of arteriosclerosis this type of diet would seem to be of great importance in the treatment of diabetes. None of Geyelin's



children have developed arteriosclerotic changes. Furthermore, the diet should serve as a great protection during the stress and strain of acute infections. Such a diet certainly makes for palatability, keeps the patient happier and frequently saves expense in the reduced amount of insulin needed.

A word of warning concerning arteriosclerosis in diabetes comes from Joslin (87) who is so intimately associated with the disease. He reminds us that although our equipment for coping with the disease has improved, there is a striking increase of arteriosclerosis among diabetics. He furnishes interesting statistics. Deaths in diabetics due to arteriosclerosis during the Naunyn era were 15 per cent, the Allen era 26 per cent, the Banting era 41 per cent and among his own cases during the last four years 50 per cent. Truly an alarming increase! This mortality rate he claims is  $1/3$  greater than for the population in general. Naturally one factor influencing the incidence of death due to arteriosclerosis may be found in the reduction in death rate due to coma which was 61 per cent in the Naunyn era and only 11 per cent at the present time. There has been a reduction in the incidence of active tuberculosis among diabetics. Furthermore, the average length of life twenty-five years ago was 44 as compared with 60 now. Joslin believes cholesterol is an important factor in the development of arteriosclerosis. Certainly there is a tendency to high values in diabetes, values which can be influenced by a diet low in cholesterol. Therefore if you are a diabetic and Dr. Joslin be your doctor you may never have more than one egg a day!

Within the past few years several cases of tumors involving the pancreas associated with hyperinsulinism have been reported. Carr and associates (88) add the most recent case described in the April 25th issue of the *Journal of the American Medical Association* where may be found references to other cases. In several of the patients the tumor has been removed successfully with clinical cure, in others

the tumor was malignant. The clinical picture is in every way similar to the familiar insulin shock and relief secured by the administration of glucose.

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# PRINCIPLES GOVERNING CONTACT OF PHYSICIANS WITH THE PUBLIC THROUGH THE PRESS, LECTURE PLATFORM, LAY PERIODICALS AND THE RADIO.

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## FOREWORD

In setting forth the Principles Governing Contact of Physicians with the Public through the Press, Lecture Platform, Lay Periodicals and the Radio, The New York Academy of Medicine and the Medical Society of the County of New York, through their Medical Information Bureau, have been guided by the belief that the members of the medical profession, and particularly members of these two organizations are prompted by the desire to act in accordance with medical traditions and that code of ethics which, in its last analysis, has been laid down for the benefit of the public rather than the profession.

Action in accordance with this general standard has become particularly complex and difficult during recent years in the matter of the approach to the public through various forms of publicity. The principles which have been adopted governing this relationship are presented more to aid our memberships in knowing the course to be followed in any given case, rather than with the intention of making fixed rules to which strict adherence must be demanded. It is our desire to be helpful and co-operative rather than disciplinary. In this spirit we ask the co-operation of our associates in the hope that the principles herein set forth will be an aid to them and that, with this aid, occasion for taking cognizance of unethical publicity will not arise.

CHARLES GORDON HEYD,

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*Approved by Council of The New York Academy of Medicine, May 27, 1931.*

*Approved by Comitia Minora, Medical Society of the County of New York, Oct., 9, 1931.*

The present tendencies in social and economic life have made it desirable that the medical profession, both as an aggregate body and through its individual members, should become more articulate in its relation to the public.

However, this being something of a departure, it is necessary that a working set of principles be formulated to guide physicians in their public contact with the community, to the end that the best interests of the community be served and that ethics be not violated.

In considering the common avenues through which the profession and individual physicians may address the public, namely the press, the radio, the public platform and popular publications, we find three possible types of approach. These are publicity, propaganda, and public health education.

### *Publicity*

Publicity we witness in the medical world under two aspects. In one it gives due public notice of events which constitute legitimate news, such for example as the election of new officers in a medical organization; the opening of a new hospital; the award of a prize for distinction in medicine and the like. Such publicity is legitimate and desirable, and the use of a physician's name in this connection is not reprehensible.

There is, however, another form of publicity unfortunately employed by a small section of the medical world, which has for its aim the exploitation or advertisement of an individual through mention of his name in the public press.

In such publicity, the comings and goings of the individual are featured, his connections, achievements and honors are mentioned and he is thereby deliberately and often without any warrant given undue prominence in the public eye. This form of publicity is objectionable, because its aim is reprehensible and the effect upon the public and

upon the profession will be deleterious. This type of publicity among physicians cannot be countenanced.

### *Propaganda*

Propaganda has for its main objectives the arousing of public interest in supporting and acting on health matters.

In propaganda, emphasis is placed on some matter of public health interest and only incidentally upon the physicians connected with it. Tuberculosis prevention, cancer control, diphtheria prevention are legitimate public health items for propaganda. The appearance of physicians' names in connection with such agitations is by the exigencies of press practices necessary and allowable.

### *Public Health Education*

Public Health Education differs from publicity and propaganda by the nature of its content. A statement, for example, that measles is a much neglected and dangerous disease made by Dr. Jones may serve as a typical example of a public health education message. Such a statement should not give special prominence to its maker. On the other hand, the statement is given impressiveness and authoritativeness when emanating from a representative physician or from an official medical body. Such a physician speaks not for himself but for the profession. He serves merely as the mouth piece through which is expressed a fact universally agreed upon by physicians.

### *Radio Broadcasting*

The radio presents a number of singular problems which need individual consideration. It is highly desirable that the medical profession should take advantage of the opportunities for constructive propaganda and for health education presented by the radio. And yet the radio is a medium in which the personality of the speaker, understood in its widest implications, counts for much. Anonymity on the radio is, therefore, incongruous. A physician making an address on the radio must of necessity be introduced by name. More than that, to establish his right to

speak his standing or connections, educational or associational, must be given.

All of these requirements can be fulfilled without violence to good taste or ethical procedure. The speaker's name may be given by the announcer without adorning and superlative references to his abilities or achievements. "Dr. John Jones, Clinical Professor of Medicine at the X. Y. Z. University" will suffice as an introduction. Dr. John Jones, who is a practicing physician, should not be introduced as an internationally famous authority, etc.

In the body of the radio paper, references to the person of the speaker, his singular achievements, unique and outstanding practices, should be kept down to an absolute minimum. In theory, the physician speaking on the radio is the vocal representative of the medical profession addressing the public. He brings to the public the fruits of many men's labors. In this, he is the custodian and administrator of the wealth accumulated by the scientific endeavors of the profession. His personal interests, and individual convictions must be placed secondary to the interests and dominant convictions of the profession. There are proper channels provided for the advancement of a physician's medical ideas.

It is desirable that talks over the radio by physicians should be given under the auspices of the designated committees of the New York Academy of Medicine and of the Medical Society of the County of New York.

Commercial organizations may purchase time "on the air" with increasing frequency in order to procure good will, and use it for broadcasting public health information. Frequently, physicians are employed to compose and deliver such broadcasts.

Provided that the commercial organization is of reputable standing, there is no objection to physicians accepting such employment. A physician must not, however, make his address an endorsement or testimonial for the



product or products of the organization on whose time the broadcast is given.

In order to safeguard himself and the profession, when such employment is offered him, a physician should confer with the Medical Information Bureau, both as to the standing of the commercial organization with which he is to make a connection and the contents of the paper or papers he proposes to broadcast.

It is also important that the announcer's continuity should be acceptable. No exaggerated or unwarranted claims should be allowed, nor should the announcer be permitted to imply that the speaker endorses the commercial organization or its products.

### *Magazines and Periodicals*

Articles written by physicians for magazines on medical topics affecting the profession should be subject to pre-publication review by the local medical organization.

### *Summary*

The full intent of these considerations is to facilitate and in no way to hamper educational contact of the profession with the public. They are designed to encourage the expression of the views of the profession to the public. They provide against objectionable publicity by self-seeking individuals whose only design is to aggrandize their persons beyond all merit.

They are formulated for the protection of the public, and for the advancement of the basic interest of the profession by whose progress or regression we all are fundamentally affected.

## SCIENCE AND CULTISM\*

*An Editorial Reprinted from The Journal of The American Medical Association*

Feb. 1, 1930, Vol. 94, pp. 342 and 343.

Now and then the medical profession is upbraided by the proponents of various notions in the field of health and science because it fails to give to their claims what they conceive to be adequate consideration. Again and again, the difficulties of Galileo, Harvey, Jenner and Pasteur, when they attempted to convince the leaders of their times of the importance of their discoveries, are cited as evidence that scientists are intolerant. Apparently cultists and others who have had but little experience in reasoning and logic, or with what is known as the scientific method, fail to take into account the fact that the world has moved since the time of the prophets, and that science has advanced more in the past fifty years than in the previous fifty centuries. James Harvey Robinson wrote an interesting essay on "The Importance of Being Historically Minded." With a proper perspective, one realizes that science is today in a position to demand evidence to an extent that might not have been warranted in a previous period when the whole world was dominated by magic and mysticism.

Recently, Mr. Chester Rowell, feature writer for the San Francisco *Chronicle*, discussed the appeal for tolerance made by faith-healing cults in the Los Angeles *Times*, following an exposé by the editor of *The Journal* of some of the weird quackeries existing in Los Angeles. Mr. Rowell says:

But the appeal for "tolerance," by one "school" of another, is an example of a common fallacy. There is no "tolerance" of astrology by astronomers. There is no "tolerance" of fortune-telling by psychologists, nor of perpetual motion inventors by physicists. Geologists do not locate oil or water by

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dowsing with a forked stick, nor "tolerate" those who do. Entomologists do not "tolerate" those who would exterminate insect pests by interfering with their spontaneous generation. Scientific agriculture does not "tolerate" the theory that potatoes grow wrong unless planted in the dark of the moon. All these "schools" exist, and they are all rejected outright as unscientific superstitions by every scientist in the world.

On the other hand, good Catholics tolerate the Holy Rollers, and Buddhists tolerate the Mormons. Atheists tolerate the faith of Christians and Christians the unfaith of atheists. Protestants and Christian scientists tolerate each other's religion, each respecting the right of the other to seek God in his own way. But the law of the land did not tolerate polygamy, when the Mormons said it was religion, and the Regents of the University of California do not permit an antivaccinationist student to endanger the health of other students, even though he calls his objection religious.

So in medicine. If it were a matter of faith, dogma or canons, one "school" should "tolerate" another. If it is a matter of science, then the only distinction is that of scientific and unscientific. And between science and non-science there is no equality of right, and no basis for tolerance. The fact that millions of devout people in India believe in casting their horoscopes by the stars does not erect them into a "school" of astronomy, nor impose on astronomy any obligation to recognize them. They are neither "regular" nor "irregular" astronomers—they are not astronomers at all. Neither is any unscientific theory or practice of healing any part of the science of medicine. There are only two sorts of medicine, scientific and unscientific. And of the unscientific "schools," science has only this to say—that they are unscientific.

How, then, shall we distinguish which principles and practices of healing are scientific, and which are not? The simplest test is that which we unhesitatingly apply in every other branch of knowledge. That is the judgment of scientists. If the scientists say that a certain thing is scientific, we accept it as such. If they all say it is unscientific, we say likewise, at least until it has succeeded in convincing them. Every scientific university in the world teaches astronomy, and not one teaches astrology. All of them teach chemistry and not one teaches alchemy. Every university in the world teaches scientific medicine, and not one of them—not a single one in the whole world—teaches or recognizes any of the "schools" or sects for which the *Times* speaks. If the unanimous voice of science means anything, this is its verdict.

The next test, and the decisive one, is that of method. Scientists may be mistaken, sometimes, in their results and conclusions. Sometimes a thing which seems true in the light of incomplete information becomes only partly true in the light of later discoveries. But science is not mistaken in its method. That method is systematic observation and experiment, and the submission of these observations and experiments to the scientists of the world, for them to repeat, to test and to scrutinize. Whatever pursues that

method and is approved by the test is scientific—including, in medicine, light rays for tuberculosis, diet for many ailments and hydrotherapy for certain mental conditions. Whatever does not proceed by that method, or fails by that test, is unscientific—including all the cults, sects and schools which Dr. Fishbein rejects and the *Times* defends.

Mr. Rowell has placed his finger unerringly on the weaknesses of the cultists. His logic might well serve as a text in the schools, not only that it might aid the younger generation in learning the art of reasoning and judgment, but also that physicians might realize the basic folly of the strange schemes which are constantly being introduced to the public around them.

## INTERNATIONAL HOSPITAL ASSOCIATION

At the close of the Second International Hospital Congress which met in Vienna from June 8 to 14, the representatives of the 41 countries participating in the Congress voted unanimously to organize an International Hospital Association.

The purpose of the Association is to bring about an international exchange of opinion and international co-operation in all problems and in all fields of hospital work and in all relationships, economic, sociological and hygienic. The Association is composed of two classes of members: ordinary members consisting of national hospital associations and associate members.

The latter comprise individuals associated in one way or another with hospitals or cognate institutions and representatives of firms or organizations standing in a business relationship to the hospitals, such as architects, builders, manufacturers of hospital supplies, merchants and the like.

The associate membership in the International Hospital Association entitles the members not only to free subscription to the "Nosokomeion," the official organ of the Association, and to full participation in the International Hospital Congresses, but above all, to participation in the work of the 10 permanent committees. These committees under the leadership of recognized specialists in various fields will devote their time to working out standards for the guidance of the hospital field throughout the world.

Dr. René Sand is president of the Association and Dr. E. H. Lewinski Corwin is secretary-general and treasurer.

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## DEATHS OF FELLOWS OF THE ACADEMY

GEORGE THOMSON ELLIOT, M.D., Otisfield, Maine; graduated in medicine from the University of Louisiana, Baton Rouge, Louisiana, in 1881; elected a Fellow of the Academy February 2, 1899; died, September 14, 1931. Dr. Elliot was Professor of Dermatology at the New York Post-Graduate Medical School from 1896 to 1898 and at Cornell University Medical School for the next twenty-two years. He was Assistant Visiting Physician and Pathologist to the New York Skin and Cancer Hospital from 1884 to 1904 and dermatologist to the Denilt Dispensary for ten years.

ARTHUR LYMAN FISK, M.D., 145 East 54 Street, New York City; graduated in medicine from the Harvard Medical School, Cambridge, Massachusetts, in 1889; elected a Fellow of the Academy March 2, 1893; died, October 8, 1931. Dr. Fisk was a member of the Surgical Society of New York and was at one time connected with Post-Graduate, General Memorial and Trinity hospitals.

THEODORE HARVEY KELLOGG, M.D., Riverdale Lane, New York City; graduated in medicine from Bellevue Hospital Medical College, New York City, in 1865; elected a Fellow of the Academy April 3, 1879; died, September 20, 1931. Dr. Kellogg was a Fellow of the American Medical Association, a member of the County and State Medical Societies, a member of the Neurological Society and a member of the American Psychiatric Society.

WILLIAM LELAND STOWELL, M.D., Bronxville, N. Y.; graduated in medicine from New York University, New York City, in 1881; elected a Fellow of the Academy January 2, 1890; died, September 30, 1931. Dr. Stowell was elected a member of the Committee on Admission of the Academy December, 1914 for three years, and was Assistant Secretary of the Academy from 1918 to 1921. He was a member of the Alumni Association of City Hospital and associated with many other professional organizations.

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# BULLETIN OF THE NEW YORK ACADEMY OF MEDICINE

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## EDITORIAL

### THE ROMANTIC EPISODE IN THE HISTORY OF GERMAN MEDICINE.

What is called romanticism, as a literary, artistic and humanistic phenomenon, came into being with the Napoleonic Wars, as a reaction against the artificial and case-hardened formalism of the 18th Century, which it was the function of the French Revolution to dissipate into space: The movement persisted well into the second third of the 19th Century, gradually giving place to the realism and objectivity engendered by the encroachment of the physical and biological sciences. The term is admittedly hard to define, indeed, some recent German scholars are fain to envisage it as indefinable, probably because romanticism was subjective, more a matter of feeling than of thought, a mode or mood of self-expression in which the mind was suffused with images, fantasies and sensations alien to the clear vision of reality. A good touchstone of romantic feeling is the fact that the spirit of the entire 18th Century was against it; for the 18th Century, with its obvious preference for surface and form to depth and substance, its penchant for well-defined concision within small compass, its clarity, elegance and sobriety, was an age of classicism, albeit of a highly artificial kind. Thus Goethe: *Klassisch ist das Gesunde; romantisch das Kranke* (The classics are sane; to be romantic is to be morbid). Now Goethe was the greatest literary figure of the transition period between the 18th and the 19th Centuries, holding with neither, yet

viewing either with a clear, equable, unbiassed perception of their merits and defects. With his Hellenic preference for clarity and serenity, the great poet sensed the Romantic cult as a way of seeing things as they are not, of envisaging reality through a refracted or highly colored medium,

"Wo selbst das liebe Himmelslicht  
Trüb durch gemalte Scheiben bricht."

Nevertheless, his attitude was sympathetic and comprehending, by comparison with that of the elders of a later time, who viewed even the natural sentiments of younger people as *quelque peu romanesques*, a straw fire that could not last. For Goethe had been a romantic himself in *Werther*, *Götz* and the lyrics of his *Sturm und Drang* period, and wrote of Byron understandingly, even if he could not appreciate the intensely modern *oratio directa* of Beethoven. Thus it happens that Scott, Coleridge, Keats, Rossetti, Heine, Tieck, Novalis, Fouqué, Chateaubriand, Poe, Schumann, Weber, the Mendelssohn of the *Fingal's Cave* and *Melusine* Overtures, the Wagner of *Lohengrin*, *Tristan* and *Parsifal*, the Mignon episode in *Wilhelm Meister* are romantic, while Goldsmith, Addison, La Fontaine, Gainsborough, Bach, Mozart, Haydn, the Mendelssohn of the Violin Concerto, the Wagner of *Meistersinger* are classical. The realism of dry science came in, as Spengler justly observes, with Stendhal, and has latterly affected even such an emotional art as music. A few examples may be apposite at this time of day, before passing to the medical phase. If you are of post-bellum vintage, having no affiliations with the Romantic period, your shortest cut to romanticism as a mode of feeling will be by way of music. Sit down to your piano and play over such unpretentious little children's pieces of Schumann as *Mignon*, *Of Strange Lands and People* or the strophes in memory of Mendelssohn. If you can do this with the proper sentiment and a beautiful intonation, you will be in the full current of romanticism. Or note with what ease Mendelssohn creates atmosphere ("The horns of elfland faintly blowing") by the two or three opening

cords of his overture to *Midsummer Night's Dream*. Or try Brahms, who through his unrivalled mastery of the structural phase of music, expressed romantic sentiment with classical perfection of form.<sup>1</sup> Opus 57, No. 3 deals with a favorite idea of such romantics as Calderon, Byron, Novalis or Poe, that of a dream within a dream. Like the opening movement of the *Waldhorn* trio, it gives shadowy form and substance to the elusive and the intangible. Indeed, James Huneker characterizes the romantic phase of Brahmsian melody as "that bitter-sweet lingering, that spiritual reverie in which the musical idea is gently propelled as if in some elusive dream." Brahms' incomparable setting of Heine's *Der Tod das ist die kühle Nacht* (the fine flower of romantic sentiment) conveys the sensation of falling asleep and of dreaming, to music as non-climatic and as vague in tonality as so many bars of *Tristan*. The conviction that modes of feeling are of more consequence than modes of thought or *manière de voir* was as implicit in the Romantic cult as the idea of identification of one's personality with external nature—

"And what but gentleness untired,  
And what but noble feeling warm,  
Wherever shown, howe'er inspired,  
Is grace, is charm?

Mild o'er her grave, ye waters shine,  
Gently by his, ye waters glide,  
To that in you which is divine  
They were allied."

Nor was this confidence entirely misplaced, in the light of Claude Bernard's reasoning that feeling is anterior to thought: "When it is said that great thoughts come from the heart, it means that they come from the feelings, for our feelings, which have their physiological origin in the

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<sup>1</sup>The kinship of the deathly chords which prelude the entrance of the Commander in *Don Giovanni* with those which accompany the final entrance of Isolde in *Tristan* is proof positive that genius is not shackled by conventions and that a composer of classical tradition, like Mozart, could express romantic emotions in an un-romantic period. So, too, the romantic feeling for the illimitable is conveyed in the etchings of Meryon, an artist endowed with classical precision of technique.

nerve-centres, act upon the heart like peripheral sensations." Feeling, however, may be variously ethical, sexual, compassionate, murderous, martial, bitter, jubilant, distressful, and so may tend to dim or discolor the *lumen siccum* of clear perception. Nevertheless, the devotion of the Romantic poets to the old Aristotelian view of the heart as the locus of cerebration was that of the writers of the Bible or the poets of Harvey's time. The sentiment of Heine's *Harzreise*—

"Steiget auf, ihr alten Träume,  
Öffne dich, du Herzens Thor"

falls flat upon our hard-boiled post-bellum generation, which has learned to distrust a parade of externalized sentiment, as being, like a gunman's funeral, a sure index of insincerity and lack of interior sentiment. The tears of *Tartufferie* are crocodile tears, yet it is equally true that the initial reactions of older people like ourselves, suddenly dislocated and thrown into undecipherable situations, can only be puzzled and distrustful. The Romantics had unbounded faith in the life of the heart and the soul.<sup>2</sup> To envisage ethical sentiment as a vague groping toward correct lines of thought ("right thinking") was the sign of the Faustian soul,<sup>3</sup> confirmed and sanctioned by no less than Goethe himself—

"Ein guter Mensch in seinem dunkeln Drange  
Ist sich des rechten Weges wohl bewusst"

In his studies of great leaders of science, Wilhelm Ostwald distinguishes between the Classicists, who seek and attain to formal perfection and completeness in their

<sup>2</sup>Cf. the concluding stanza of Schiller's *Thekla. Eine Geisterstimme*, or Emerson, who, through Carlyle, was profoundly influenced by the cult: "We need fear nothing from the progress of the soul. The soul may be trusted to the end," etc.

<sup>3</sup>With fine philosophic insight, Spengler makes the mathematics the point of departure of his differentiation between the Apollonian (Antique), Magian (Mediæval, Arabian) and Faustian (Modern) soul, as exemplified by Euclidian geometry, finite and limited to three dimensions; the magical (labor-saving) aspect of algebra and trigonometry (the special achievement of the Arabs); and the trend toward the illimitable and the infinite in modern mathematics (surds, imaginary quantities, infinitesimals, infinity, integration, differentiation, n-dimensional geometry, etc.).

work, as far as they have carried it, and the Romanticists, who are bold explorers of novel and untried fields, leaving behind them many loose ends of investigation for others to follow up and carry to completion. But this distinction will not help us much with reference to the phase of modern medicine we are about to consider. The Romantic episode in the history of German medicine is one of the most striking examples we have of a school of medical thought, isolated in space and time, pocketed as to locality, *sui generis*, limited to a grandiose program only, metaphysical in content, aimless or irrational in method, arising spontaneously and capable of going on indefinitely, had it not been interrupted by external forces of insignificant magnitude. It has been called "Romantic," as having the same *terminus a quo*, in point of time, as the Romantic movement in German literature and art, which outlived it and which was much more consequential in the matter of aspiration and achievement. The Romantic movement in English poetry has been elucidated with rare intelligence by Arthur Symonds<sup>4</sup> and the effect of Byron upon Chateaubriand, Heine, Musset, Lamartine, Leopardi, Foscolo, Pushkin and Lermontoff, of Scott upon Dumas, Mérimée and Stendhal, of Poe upon Baudelaire, is well known to all students of modern European literature. The *ipogrifo violento* of Calderon's *Vida es Sueño* is the same old hippogriff that Wieland mounted—

"Noch einmal sattelt mir den Hippogryphen,  
Zum Ritt in's alte romantische Land."

But the literary romanticism of England, France, Italy and Russia had no effect whatever upon English, French, Italian or Russian medicine. With Germany, the case was different. The most brilliant and fascinating account of German literary romanticism is that of Heinrich Heine,<sup>5</sup> who was himself an active participant in the movement of which he was, at the same time, an amused, sometimes

<sup>4</sup>Symonds: *The Romantic Movement in English Poetry*.

<sup>5</sup>Heine: *Beiträge zur Geschichte der neueren schönen Literatur in Deutschland*, Hamburg, 1833. Later published as "Die romantische Schule."



sardonic spectator. With a polite preliminary bow to Mme. de Staël, Heine traces German Romanticism directly back to its true origins, the mediæval Eddas, epics and sagas, through Goethe (*Sturm und Drang*) up to the advent of the Schlegels, who began as self-appointed press-agents of the poet. German romanticism was compounded of dreamy, sometimes effusive sentimentality, religious mysticism, a tendency to hark back to the Middle Ages, a preference for intuitive knowledge, based upon feeling, to the trite rationalism of the 18th Century, a yearning for strange lands and people, for the infinite and the illimitable, an aversion to the real and rational, a penchant for the irrational, and in the case of Wieland and Friedrich Schlegel (*Lucinde*), of what Carlyle dubbed "a mixture of moonshine and sensuality." Exoticism, so manifest in Goethe's *West-östlicher Divan*, began with Herder's *Stimmen der Völker* and is sufficiently exemplified in Schlegel's *Sprache und Weisheit der Indier* (1808), in the admirable translations of Shakespeare by Schlegel and Tieck, of the Shah Nameh by Görres, and of Hindu and Spanish drama by the two Schlegels. Nietzsche, in fact, defined the Romantic cult, as the work of erndites (*eine Gelehrtenbewegung*).<sup>6</sup> Of the German Romantics, Görres and Clemens Brentano were Roman Catholics; the Schlegels, Tieck, Novalis, Stolberg and Werner were converts to Catholicism. The Schlegels were violently assailed by the Lutheran pastor-poet Voss and eventually repudiated, with some ingratitude, by Goethe himself. In Heine's view, that ended the movement. Its spirit, however, survives in the *Lieder* of Brahms or the harps and hunting-horns in the second act of *Tristan*, even as the spirit of

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<sup>6</sup>The same exoticism is manifest in Byron's Oriental romances, in Tom Moore (*Lalla Rookh*), in Southey (*Thalaba*), in Chateaubriand (*Atala*), Théophile Gautier, Baudelaire, Mérimée (*Clara Gazul*) and even in Flaubert (*Salammbô*). A more solid culmination was the philosophy of Schopenhauer, Sir Richard Burton's translation of the Arabian Nights or Max Müller's renditions of the Sanskrit classics. In other words, exoticism was a casual, accidental, rather than essential trait of romanticism. In like manner, the flaming red waistcoat of Théophile Gautier and the demonstration of *les jeunes France* at the initial performance of *Hernani* were boyish and sensational rather than "romantic."

*Tintern Abbey*, *Christabel*, *St. Agnes' Eve*, *Morte d'Arthur* and *The Blessed Damozel* survives in such lines as these of the Irish poet Yeats:

"For there the mystical brotherhood  
Of sun and moon and hollow and wood  
And river and stream work out their will;  
And God stands winding His lonely horn,  
And time and the World are ever in flight."

The German medical romanticists themselves constituted a vague sort of mystic brotherhood, active during the first third of the 19th Century and productive of a considerable body of literature, now obsolete and so indefinite in tendency that it has been found impossible to characterize it in simple terms. In the elaborate and exhaustive study of Dr. Ernst Hirschfeld (Berlin),<sup>7</sup> of which some account follows, the movement is elucidated, not as a specific tendency or line of thought, but as the tumultuous yearning of a whole generation of physicians, drifting aimlessly, with very vague directives and objectives, but all animated by the same spirit of enthusiasm for a cult (*keine Richtung, sondern eine Generation*). The Romantic movement of German medicine originated in the Southwest, in the region around and about the Isar, Main and Neckar rivers. Its founder was the creator of the Nature Philosophy, F. W. J. von Schelling (1775-1848), whose passage from the chair at Jena (1798) to Bamberg (1799-1803), to its successor Würzburg (1803-1806), and to Munich (1806), to which the medical faculty of Landshut was transferred, marks the main locus of romantic activities in philosophy and medicine.<sup>8</sup> Spheres of influence radiated, however, from these foci to such universities as Erlangen, Freiburg, Leipzig, Tübingen and Heidelberg. During the earlier years of his professoriate, Schelling

<sup>7</sup>E. Hirschfeld: *Romantische Medizin*. *Kyklos*, Leipzig, 1930, III, 1-89.

<sup>8</sup>Hirschfeld (*op. cit.*, pp. 40-47) gives a spirited and circumstantial account of the ferment of intellectual and social activity at these university centers, of which Jena was regarded as the cradle of the Nature Philosophy. "It would be difficult," says Ringseis (Schelling's physician), "to convey to the present generation any idea of the foaming over of unbounded enthusiasm which activated and inspired us in this period, so different from now."

produced in rapid succession, the writings which were to make his influence decisive, viz., *Ideas toward a Philosophy of Nature* (1797), *On the World-Soul* (1798), *First Sketch of a System of Nature-Philosophy* (1799)<sup>9</sup> and *A System of Transcendental Idealism* (1800). A facile enthusiast, passing hastily from one position to another, Schelling is now regarded as one who philosophized brilliantly and in an eclectic manner, hastily appropriating ideas from one predecessor or another, but never creating a definite, consistent philosophic system, like Kant or Schopenhauer. His present position in the history of philosophy may be stated about as follows:

Kant's fundamental proposition is that only the surface appearance of things (*phenomenon*) is apprehended by our senses, while the essence or inmost nature of things (*noumenon*) is forever beyond our ken. His pupil Fichte dispensed with the master's distinction between subject and object and affirmed virtually that matter is only a manifestation of mind, whence reality exists only in our perception of it. Schelling, who was profoundly influenced by the findings of Galvani, Mesmer and Lavoisier, sought to improve upon the Fichtean idealism by reaffirming the actuality or objectivity of matter, but developed the notion of external nature as synthesis or interplay of opposing forces, positive and negative, attractive and repulsive, centripetal and centrifugal, expansile and contractile, oxidative and reductive, male and female (Polarity). Subject and object, real and ideal, mind and matter, then, have some vague, neutral substratum at which they can be synthetized as identical (The Absolute). Analogous to light, and its trinity of components, magnetism, electricity, chemical action, was the new Kantian concept of the living *organism*, with its components, irritability, sensibility and reproductive power. All these had again some common substratum of Identity. Nature is identical with our perception of it. Perception of this Identity, of the Absolute, of the center of gravity at which antinomies and polarities are fused and conciliated<sup>10</sup>, is a function, not of the mind, but of "a higher organ of cognition" (*ein höheres Organ der Erkenntnis*), such as Goethe attributed to those endowed with mathematical genius.

<sup>9</sup>This publication, written by Schelling at the age of 24, was hailed by Steffens in the *Zeitschrift für spekulative Physik* (1, 2, 121) as "the first live spark thrown into a dead chaos of dissipated energy" (Hirschfeld). In other words, the Romantic School was not a creator or fabricator of science, but rather a pace-maker for the more realistic generation which followed it. As Fr. Borden observes, its achievement was limited to its program (*Seiner Leistung besteht in seiner Intention*).

<sup>10</sup>"To reconcile contradictions is perhaps the highest function of the higher logic." Novalis.

We can best sense the far-reaching influence of this nebulous composite of philosophizing by a fugitive glance at the literature of the period. Emerson dabbled in it (*Transcendentalism, The Over-Soul*), Browning's Bishop Blougram played with it, and the Spinoza-Schelling doctrine of Identity is as recognizable in the tales of Edgar Poe (*Ligeia, Morella, William Wilson, A Tale of the Ragged Mountains*), as in Wordsworth, Shelley (*Adonais*)<sup>11</sup> or Emily Bronte:

"And thou art now a spirit pouring  
Thy presence into all:  
The thunder of the tempest's roaring,  
The whisper of its fall:  
An universal influence,  
From thine own influence free,  
A principle of life—intense,  
Lost to mortality."

In some way, the basic concepts of this philosophy were in the air, had gotten across into English and American literature, but upon English, French and American medicine their influence was *nil*. Not so with the medicine of Southwestern Germany during 1800-1830. In the *Jahrbücher der Medicin als Wissenschaft* (1805-8), edited by Schelling and A. F. Marcus, the philosopher holds out the possibility of elevating medicine to the status of Nature as a whole, as something complete in itself and developing itself out of its own ideal elements:

"Our present period is especially propitious, in that we are able to indicate, what many centuries have not been in position to indicate, namely the possibility of activating philosopher and scientist, chemist and anatomist, zoologist and physician to team-work toward the common goal of elevating the science of the organism and consequently medicine, to the height to which it should attain by gradual development."

"Medicine is the crown and flower of all the natural sciences, just as the living organism, and the human organism in particular, is the crown and flower of nature."

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<sup>11</sup>Notably in the lines which Osler quoted:

"He is made one with Nature: there is heard  
His voice in all her music, from the moan  
Of thunder to the song of night's sweet bird;  
He is a presence to be felt and known." *Adonais*, XLII.

"Medicine must become the general science of organic nature, of which its separate branches were hitherto like so many twigs only. To give it this comprehensiveness and inner unity, as well as the rank of a science, its basic principles must not be derived empirically or hypothetically, but must proceed from itself as philosophic principles."

"Here philosophy has no further task than to bring formal outward unity into the complexity at hand and to give a good name to physicians, whose science, from time immemorial, has been rendered ambiguous by poets and philosophers."

This nebulous program, today in process of realization, as far as biology or general physiology is concerned, was to be productive of some of the wildest medical theorizing conceivable, while its influence upon bedside practice, as we shall see, was to be baleful and baneful. The fatal fallacy in Schelling's application of Nature Philosophy to medicine lies, as Hirschfeld points out, in the wide rift between facile theorizing and the working out of such theorizing in actual experience and practice. Here Schelling and his adherents were driven to endless shifting and winding and tacking about, to no purpose whatever. They were blind to the fact that if medicine was to be advanced at all, it would be, not through philosophizing but by deliberate application of chemistry, physics and microscopy to the outstanding problems of the day. Due to the fact that it was a local emotional reaction against the materialism of the French *philosophes*, active within a limited area near the French frontier, the cult met with little opposition, nay, was applauded and patronized by Humboldt and Goethe and championed by such literary romanticists as Görres, Novalis and the Schlegels. Humboldt saw the Nature Philosophy as offering the possibility of a better explanation of vital phenomena than either chemical action or irritability, but sounds a note of warning against top-heavy theorists whose chemistry would be done in their heads rather than with their hands.<sup>12</sup> Goethe, like every one else, was attracted by the pseudo-physics of "polarity," and deliberately applied it, to good philosophic purpose, in his speculations on the morphology of plants and the

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<sup>12</sup>Hirschfeld, *op. cit.*, 9.

theory of colors. Schelling postulated a general dualism throughout nature, e. g., in the magnetic polarity of the earth, and saw electricity as a balancing principle of opposing forces. His assumption of the ultimate unity of magnetism, electricity and chemical action in the scheme of nature finds some confirmation in thermodynamics (Helmholtz, Willard Gibbs) and in the subsequent work of Einstein. His notion of a natural ascending development (*Steigerung*) out of the lower forms of life into the higher foreshadowed the doctrine of evolution and was implicit in Goethe's speculations on morphology (metamorphosis) and the later findings of Darwin and Herbert Spencer. His third principle, that of cyclic processes and recurrences in nature, was as old as the Greeks (Heraclitus) and found its avatar in the Nietzschean concept of an "eternal return" of things. In Schelling's philosophy, however, the universe itself is conceived of as an organism, activated by a mysterious *anima mundi* (*Weltseele*) and it is just at this point that his reasoning becomes "romantic." Meanwhile, cyclic processes became the fashion in philosophy. Friedrich Schlegel and Görres even conceived of cycloid manifestations in history and art. If "history repeats itself," however, it is due to the fact that the human mind, as Spinoza saw it, is deficient in originality, "inadequate in ideas," and not to any mysterious general law behind such commonplace recurrences or coincidences. More remarkable was the Kiehmeyer trinity of irritability, sensibility and reproductive power as the criteria of vital function (1793). Oken, on the whole the ablest biologist of the Romantic group, predicted a future for scientific pharmacology, anticipated the cell-theory of Schleiden and Schwann, and the notion of the origin of life from primordial ooze (*Urschleim*), as also the work of recent geneticists on intersexuality (Buff-Orpington hen) in his view of the dominance of the male principle in nature ("Ideally every child should be a boy"). Goethe and Oken were forerunners of Darwin. Indeed, as speculative biologists, the German Romantists were far from contemptible. They were better biolo-

gists than doctors. It was through their passion for literary analogies, their propensity to play with ideas, that they were led into extravagance, whence Heine likened them to the schoolboys in Eldorado, whom Candide found playing with gold nuggets instead of marbles. Görres, whom Hirschfeld styles "the Proteus of the period," was so carried away by the idea of polarity that he made it the centric theme of books on sexual philosophy and world-history. Steffens postulated a sexual polarity between mammals (man) and birds. Adam Heinrich Müller, defined by Hirschfeld as "the androgyne (*Zwittergeist*) of political romanticism," labored the theme in sundry sociological and governmental relations. The romantic impetus toward whatever seemed new and strange made Görres a changeable chameleon, whose face, in later years, was described by the dramatist Hebbel as a battlefield of slaughtered ideas: "Every notion which has agitated the waves of German thought since the Revolution left its furrows upon his brow, and those furrows persisted, even after the Jacobin had subsided into the quietist." Görres began as an agitator, merged into a mythologist and wound up as an Ultramontanist, but was always ready to stray into whatever attractive by-path, particularly medicine, which he tried to teach to himself by working fourteen hours a day during eleven months of 1793. He took up the newer French chemistry, translated Fourcroy's *Synoptic Tables of Chemistry* in 1800, and in 1802-3, affiliated himself with the Nature Philosophy School by his lucubrations on dualism, polarity and "organomy." In 1805, he published an "Exposition of Physiology," with the sub-title "Organology." These writings were extensively reviewed *au grand sérieux* in the medical periodicals of the time, were even noticed by Goethe and later by Virchow. Görres became the leading expositor of Schelling, whom Virchow, in 1893, dismisses with the following sarcasm: "By bold incursions into the territory of physiology and pathology, Schelling succeeded in attracting the notice of physicians to himself and his ideas." Görres was abundantly ridiculed for pansexualism, priapism, etc., and

being a hard hitter and a master of billingsgate, retorted in kind. His Exposition of Physiology, a bit of "fresco painting" on a theme which became "the spring-board for all the philosophic theorizing of the time" (Hirschfeld), begins as follows:

"The task of physiology is to demonstrate that cosmography can be projected into the concept of the living organism, to translate individual biologic relations into their larger cosmic aspects, so that one may visualize the general relations of the concrete and clearly read in the light of the stars what is hidden in earthly obscurity."

The spirit at work is evidently the same Faustian *Erdgeist* which so agitated Carlyle:

"'Tis thus at the roaring Loom of Time I ply,  
And weave for God the garment thou seest Him by."

Paracelsus, whom Hirschfeld rightly defines as a Romantic, expresses himself in much the same way:

"For medical philosophy must be so ordered that the ways of reason may be visualized, that it may sound in the ears as the fall of the Rhine, that the resonance of philosophy may be as readily sensed by the ear as the roaring of wind on the sea."

In his defence of Paracelsus, Görres becomes as turbulent and declamatory as Hohenheim himself:

"For now three hundred years, these old fellows have baited him along in his big swaddled trousers, and in every new text-book he has been lashed by fanatics as a dreadful example. It is plain, indeed, that the man does not write his native tongue correctly; he never distinguishes between this and that; but native fire he has, as all must admit who have studied him. He means well when he substitutes for the evils he combats something worse. He is a defender of the principle of progress. His enemies have delivered him up to posterity as a coarse, fantastic fellow. They cite with ease his uncouth, boorish outbursts; but of their own eternally spiteful, implacable enmity; their venomous, knavish, incessant nagging; their sly lookout for every weak spot in his armor; in brief, of the whole wicked heart-rending system whereby spirits of their ilk hound a stronger spirit, who passes on, unconcerned over the little herb-gardens they have planted or some occasional head of cabbage he has trampled, of all this they are wisely silent. The mob listens to the prating of these elders, carries it further from street to street, whence it passes into history and becomes authentic. And now, for the first time, the victim of calumny begins to come into his own, and he can now be useful as a witness at the bar of justice, like every other honorable man. What happened to him has hap-



pened to many. It is well that the period of boorishness in our literature is over for a while, but it was necessary in order to give place to something better. For the mob would trample majesty itself into the mire, in every public procession, were it not for the Swiss, who march ahead and clear the way with their halberds."<sup>13</sup>

Paracelsus was also taken up by Novalis and Friedrich Schlegel, and although attacked, in a somewhat senseless way, by Hufeland (1797), was finally rehabilitated by the biography of Rixner and Sibner (1819) and the later researches of Sudhoff.

Of all the literary romanticists, the most striking and outstanding was Friedrich von Hardenberg (Novalis). A poet of ultra-refined disposition, like Hölderlin too sensitive and highly civilized for this world, doomed to die prematurely of consumption, Novalis read his own sad fate into his interpretation of life and nature. In spirituality (Hymns to the Night), he resembles Shelley, whose hymn "To Night" was set to choral music by the romantic Hungarian composer, Robert Volkmann. Novalis was a mystic and a mage, who read into Schelling's concept of a World-Soul the idea of God. In his dualisms, his polarities, his views of the physician as a *magus* and of life as a disease, his confidence in "the magic wand of analogy," he reveals gnostic leanings (Hirschfeld). Schelling unjustly regarded the poet in the light of a butterfly, flitting around the surface of things without penetrating into their essence.<sup>14</sup> In medicine, Novalis favored the Brunonian system ("Brown is the physician of our time"), yet admitted that Brown had never once illuminated the nature and origin of disease. Novalis identified the outstanding constitutional peculiarity of his generation with that of his own make-up, namely the fragile or asthenic. The main interest of his reasoning about medicine centers in his opposition of the romantic *psyche* to the classical (Hippocratic) *physis* (Hirschfeld). He was the first to con-

<sup>13</sup>Cited by Hirschfeld, *op. cit.*, 19-20.

<sup>14</sup>"Ich kann diese Frivolität gegen die Gegenstände nicht gut vertragen, an allen herumzuriichen, ohne Einen zu durchdringen." Aus Schellings Leben. In Briefen. Leipzig, 1869, I, 431. Cited by Borden.

sider the psychology of the sick patient, the theme so well elaborated latterly by Sigerist.

Man is born unto suffering, he says, and diseases, particularly chronic diseases, are an apprenticeship in the art of living and in the development of mind and spirit. We are only just beginning to learn how to utilize them as the most interesting stimuli to reflection and subsequent activity. An index of disease is the instinct toward self-annihilation. May we not use it as an incentive to higher syntheses? The ideal of perfect health is only of scientific interest. The feeling of healthiness, of well-being, of contentment, is entirely personal, accidental and indirectly dependent upon external circumstances. Diseases are transcendental phenomena of heightened sensation. Life exists only on account of death, and is itself a disease, an abnormally exaggerated activity. Emotions are like drugs, not to be trifled with.

In all this, as in his romantic psychiatry, the mysticism and gnosis of Novalis are self-evident. His line of thought illustrates the morbid and mortuary aspect of romanticism, the turning away from the robust realities of life, which Goethe had in mind in his memorable criterion.

Thus far, we have considered the medical and biologic speculations of purely literary romanticists. We now come to the literary output of a generation of physicians dominated by the Romantic cult, an output considerable in quantity, bizarre in content and, in no sense, scientific in character. This prolix literature has been analyzed to good purpose by Hirschfeld, whose bibliography covers over 1500 items. It is plain, from the very titles of these books, that mere words and names meant more to the medical Romanticists than the things they stood for. Like savages, they commonly mistook the word for the thing and gloried in inventing queer terms, such as biosophy, eubiotics or tellurism, for concepts of the vaguest order. Physiology was equated with "dynamology" and there were even second-rate writings on "dynamic pathogeny" and "dynamic materia medica." Books were published on "The analogy between cognition and the reproductive instinct" (Baader) and on "The resemblance between cholera and the torpidity of hibernating organisms" (Jahn). In 1825, Wilbrand, at the meeting of German Naturalists

and Physicians, announced that the circulation of the blood has no foundation in fact, and the theme was actually posted for discussion by Oken. Enthusiasm for magnetism, mesmerism and odic force piled up a gigantic literature. Krause lectured on "psychic anthropology" and Purkinje (save the mark!) on "physiological anthropology." From the old gnostic notion of the Fall of Man (man as a degenerate god, the Devil as a fallen angel), Schelling postulated that Nature arose from a decay or decline of the universe (1797), whence his physician, Ringseis, extended the 18th Century notion of sin as the cause of insanity to disease in general. Such mystics as Heinrich, Windischmann and Ennemoser also dabbled in this demoniacal ætiology of disease. Opposition to athletics and physical exercise was part of the cult, and was maintained particularly by Henrich Steffens (the *Turnerfeind*), whose exaggerated self-esteem was ridiculed by Heine (Baas). A further step backward was the "Comparative Ideal Pathology" (1839) of Carl Richard Hoffman, who defined disease as an ideal organism in process of reversion to a lower type, so that its apparent abnormality in man may be normal in beasts. Thus rickets is a reversion to invertebrate morphology, as if man were trying to change himself into a boneless organism or mollusk. Chlorosis is a transformation to the chrysalid stage, phthisis to the sylph-like, and menstruation is comparable with moulting in the lower animals. Hæmorrhoids are "crooked intestinal limbs" and cancer is a reversion to polypoid existence (Baas). Döllinger, father of the theologian, regarded fertilization of the ovum as "something between irritation and infection," the product being a polyp. Kieser maintained that life is an oscillation between solar and telluric poles, whence sleep is a lower form of existence and horse-radish is an anti-telluric remedy (good for somnambulism). Yet he was honored with all the titles and decorations available in Prussia, Saxe-Weimar and Austria, became president of the Caroline-Leopoline Academy (1858) and is credited with a mortality of only 2 per cent out of 20,000 patients treated at his Clinic (Jena) in 17

years. Joseph Löw published a prize essay "On the Urine" (1809), the preface of which is described by Hirschfeld as a romantic dithyramb, drawing on Platonic myths and defining the Middle Ages as the "lofty romantic period of medicine." Given the time of its publication (before Fehling), the actual content could be little more than uroscopy. G. H. Schubert wrote on "The Nocturnal Aspect of Natural Science" (1808-27), also "A History of the Soul" (1850). Carl Gustav Carus expanded Schiller's verse

"Es ist der Geist der sich den Körper baut"

to the following dictum: The soul is the formative principle of the body, the body is a revelation of the soul."<sup>15</sup> J. P. V. Troxler, of Bern, maintained that the factors of life are light and gravity, that respiration and digestion are identical in tendency and that "excretion is secretion directed externally and secretion is excretion directed internally." In the view of Baas and the sounder historians, it was necessary and sufficient for the medical Romantists to carry their fling into extravagances of this kind in order to clear the way for scientific realism. Lop-sided exaggeration in any school of medical thought, says Baas, resolves itself into its logical opposite. The Romantics illustrate the dictum of William Blake that the road to wisdom lies through excess. But their activities were an intermezzo, circumscribed in space and time, and existing on an entirely different plane from the "enlightened" rationalism of the 18th Century and the scientific objectivity (*Sachlichkeit*) of the later 19th Century.

And what practical results, in diagnosis and therapy, came out of all these flights of fancy and bouts of verbosity? In the findings of Hirschfeld, nothing of consequence! Brown, at least, saw diseases as relative stages of excitement (sthenic, asthenic) with corresponsive exhibition of sedatives and stimulants in lieu of treatment; but beyond a brief intermezzo of Brunonianism, Hirsch-

<sup>15</sup>Had the anatomists of the 17th-18th centuries had any notion of ductless glands and internal secretions, they would doubtless have located the soul in the endocrine system.

feld finds not the slightest divergence from old established lines of therapy in the hospital records of Bamberg, Munich, Heidelberg and Berlin during the Romantic period, nor any evidence of therapeutic change or innovation in the German medical periodicals and private memoirs of the time. From Röschlaub and Marcus (the leading German exponents of Brown's theory of disease as excitability), Schelling picked up a few wrinkles of Brunonian therapy in the Bamberg Hospital, and thereby hangs a tale. Caroline, wife of August Wilhelm von Schlegel, had by her first husband a daughter, Auguste Boehmer, to whom Schelling became engaged. In 1800, Auguste fell ill of dysentery at the mineral bath at Bocklet, and Schelling, who had previously interfered in the sick-room when Caroline was ill, meddled with the case of Auguste to such purpose that she died shortly thereafter. The inside history of both cases is recorded in the correspondence of Caroline's spirited sister-in-law, Dorothea, wife of Friedrich Schlegel. In the first instance, Schelling nagged Hufeland, who was in charge of Caroline's case, so that, in dudgeon, he applied Brunonian stimulants to what seemed "nervous fever." In the second, Dorothea writes: "She (Auguste) did not really die of dysentery, for as Hufeland says, people no longer die of this disease; nor could the Brown system have done any harm, as the unknown attending physician was non-Brunonian, if Schelling had not meddled with the treatment, so that Röschlaub found her dead when he arrived. The latter now maintains that her disease was fatal at the start." In spite of Röschlaub's attempt to defend him, this excursion into malpractice cost Schelling dear, for Caroline, the mother of the dead girl was the Muse of the Romantic movement, the leading literary lady of her place and time. Feeling ran so high in Jena that a medico-legal report on the case was demanded of Marcus and Röschlaub, while Schelling came within an ace of being dismissed from his university chair.<sup>16</sup> Two years later, Caroline divorces Schlegel and

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<sup>16</sup>Hirschfeld; *op. cit.*, 39-40.

marries Schelling. Nine years later, she dies suddenly of a choleric seizure and Schelling's report of the case reveals the same incompetence, amounting to impotence in the treatment of disease. These episodes constitute the *reductio ad absurdum* of Romantic medicine, the ultimate effect of which was to create "a chaos out of therapy" (Hirschfeld). Characteristic of their brief intermezzo was the fading away of the Romantics. Schelling, having lost caste in consequence of his attempt to play with medicine, merged his philosophy of Identity into a pietistic philosophy of Revelation and by 1819, had become dull, faded and corpulent. August von Schlegel and Görres, in Heine's reading, fare even worse. Friedrich von Schlegel, grown stout and self-indulgent, eats oranges and drinks wine, while his wife, Dorothea, shivers with ague. A few years later, she writes to Henriette Herz: "All that we children of earth used to call the Poetry of Life is far, far away! I could say with you that I have had enough of it. But all the same, I will not say it and I implore you not to say it again." By 1830, the School of Nature Philosophy has merged into the Natural History School, in which Schönlein, Canstatt and Fuchs attempted to revive the old Sydenham doctrine of a natural history of diseases and to classify them like plants, with a terminology as bizarre as that employed by Piorry in France. By 1840, the main protagonists are dead, the field is evacuated and the massing of new forces, such as the strictly scientific journals founded by Haeser (1840), Roser and Wunderlich (1842), Henle and Pfeufer (1844) or Liebig's cannonade of 1840,<sup>17</sup> is to no purpose; their volleys are discharged into empty space, where there is neither adversary nor rear-guard action. Wunderlich (*Wien und Paris*, 1844) and Schleiden (1844)<sup>18</sup> pronounce belated funeral orations over the remains. Toward the end of the century, Oken's text-book on natural history (1813-27) has become a Christmas pic-

<sup>17</sup>Liebig: *Ueber das Studium der Naturwissenschaften*. 1840. Cited by Hirschfeld.

<sup>18</sup>Schleiden: *Schellings und Hegels Verhältnis zur Naturwissenschaft*. Leipzig, 1844. Cited by Hirschfeld.

ture-book for children (Baas). Rokitansky remained bitter all his life about the school of Nature Philosophy, which had trailed off into nothingness long before the Revolution of 1848 cleared the atmosphere for the organized advancement of scientific medicine in Germany. With the advent of the New Vienna School, Germanic medicine crosses the Rubicon, and by 1850, medical science (Virchow, Helmholtz) begins to come into its own. But the land of brass tacks reality is still far distant, and it took perhaps a World War to establish our present acid tests: Get that patient well: Stop that epidemic.

The German romantic cult, with its view of the universe as an organism, its gnostic tendencies (dualism, degeneration, polarity, magic), its harking back to Mediævalism, its mania for fashioning its own theories out of hand, has been studied with more sympathetic understanding by the recent post-bellum generation than by the generation which followed the Revolution of 1848. Heine, who changed over from a sentimental to a satirical writer after 1848, likened romanticism to a lunatic asylum (Charenton). Baas, a German of the Germans, calls the romanticists "Teutomaniacs." Of late years, however, the cult has been subjected to intensive study on all sides, with many fine spun distinctions as to the particular *nuances* of thought and feeling which may be properly labelled "romantic."<sup>19</sup> Romantic tendencies have even been de-

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<sup>19</sup>Particularly F. Borden: *Die deutsche Romantik und die Wissenschaft, Arch. f. Kulturgesch.*, Leipzig and Berlin, 1930, XXI, 44-80. The points made are: that the German Romanticists conceived of science not as autonomous, but as heteronomous, secondary and ancillary to metaphysics and æsthetics and ultimately theology, primacy being assigned to the Absolute (unification or identity of polarities). In this scheme, the only real science was poetic and æsthetic. Truth and poetry (Goethe) became identical. Beauty was not so much the pathway to truth (Schiller) as truth itself (Keats). The universe was conceived of as an organism created by an artist, rather than by the *theos geometer* of the Deists who followed Newton. In the final phase of romanticism, science is based upon revelation (Schelling) and becomes virtually identical with religion (Görres). Romantic science was therefore literary, æsthetic, fragmentary, irrational in approach and attack, limited to a grandiose program, using any isolated fact as a springboard for extravagant fantasy, in brief, a flight into unreality which cannot be judged by the rigorous standards of knowledge gained by experience and experimentation.

tected in writers on law, like Savigny,<sup>20</sup> or in secular historians like Ranke or Michelet. The medical phase of the movement is best understood by considering it in historical sequence, as a natural reaction against 18th Century formalism and a natural concomitant of the German struggle for freedom from the Napoleonic yoke. The tendency of the physicians of Southwestern Germany was to avert their eyes from the France of Laennec and Pinel, and to fashion medical theories all their own, with the consequences we have seen. The point of departure was John Brown's theory of diseases as degrees of excitation, which had an immense temporary vogue in Germany. Then came a period of anarchy, in which the followers of homœopathy, animal magnetism and Nature Philosophy competed from three different camps. From the ensuing muddle, hard-headed, sensible men like Heim and Reil (Berlin), Frank (Vienna), Sprengel and Krukenberg (Halle), Nägele (Heidelberg) and Wigand (Hamburg) stood aloof, while Hufeland (Berlin) and Conradi (Göttingen) drifted into "a flabby, thoughtless empiricism" (Rohlf's). There followed the Natural History School (Schönlein, Canstatt, Fuchs), the School of Rational Medicine (Henle, Pfeuffer), the Physiological School (Roser, Wunderlich, Griesinger) and the Nihilistic (New Vienna) School, each having the negative merit of putting its predecessor out of business ("*Jeder dieser Lumpenhunde wird vom andern abgethan*").<sup>21</sup> The term and end was the scientific group, headed by Virchow and Helmholtz (1850). The merits of the Nature Philosophy School, in this sequence of development, were that it gave an impetus to the study of general physiology (biology) by stressing the Kantian view of the living animal or vegetable as an *organism*, and that it demonstrated the futility and imbecility of irresponsible theorizing in medicine through the chaos created thereby and its tragic consequences in the actual treatment of disease. One or two belated Roman-

<sup>20</sup>The imputation is contested with considerable heat in the *Allgemeine deutsche Biographie* (*sub voce* Savigny).

<sup>21</sup>Cited by Rohlf's. Probably an utterance of Marx.



tics developed ironical tendencies, like Heine. Marx, who kept his head through all the changes and fashions of the hour, reveals romantic leanings in *Akesios*. The psychologist Fechner apparently burlesques the cult in his *Comparative Anatomy of Angels*, his proof that the Moon is made of Iodine, his paradox that shadows are alive. The abiding impression is that of Heine's learned philosophers playing with ideas, as children play with marbles. Romantic science was surd (irrational) in the mathematical sense, rather than absurd, a circumscribed, pocketed episode in the history of ideas rather than an actual link in that chain of continuity which is the making of real, useful knowledge. In maidenly fashion, the German Romanticists drew their skirts away from experiential, experimental science as something "cold," "empirical," "atomistic," "mechanistic," but the despised, plodding Cinderella is actually responsible for such coarse approximations as the quasi-omniscience of radio, television, telephone and dictagraph, the pseudo-omnipresence of aviation, the pseudo-omnipotence of machinery or high-power explosives, suggesting Flaubert's vision of science as a monster fain to devour us. The assertion of Treitschke that the Romantic movement had more lasting effects upon science than upon poetry is, of course, utter solemn nonsense. Romanticism was not so much a "movement of erudites" (Nietzsche) as of virtual artists and poets, who dreamed of a Promised Land they were not destined to enter, whose ambition to correlate the total scheme of nature and the universe with the haphazard aspects of life stopped short with the grandiose program of their intentions. The charm of men like Novalis or Tieck is that they were men of poetic, artistic nature and the romantic aspiration of Goethe ("*ins Unendliche zu schweifen*") reverberates even in the closing measures of *Tristan*. Since the aim of the Romanticists was synthetic rather than analytic, limited to postulates and opposed to experimentation and the verification of premises, their effect upon the advancement of science could only be *nil*. As physicians, they were total failures, with a champagne appetite for unattainable ideals

of a metaphysical or æsthetic character. The contention that the modern view of history was engendered by the Romantic cult has been exploded. The Romantic view of history was again artistic and metaphysical. Like Conrad and the later novelists, the Romanticists saw that human life in chaotic periods is apt to be irrational and meaningless, whence they burned the bridge between reality and reason, denied that experience is science and sought to correlate the inexplicable aspects of human history with some mysterious "higher, inner necessity" (*fatum*), as in the Greek drama or *Götterdämmerung*.<sup>22</sup> Their contribution to history is implicit in the dictum of Novalis that "there is more truth in fables and legends than in learned chronicles,"<sup>23</sup> which is really subject matter of ethnology and folk-lore. Novalis affirmed that the historian must be a poet and believed that there may be a mysterious number-lore in chronology. All along the line, the scientific contribution of romanticism was limited to its good intentions. The great triumphs of German romanticism were in such things as The Flying Dutchman or Lohengrin, Heine's Book of Songs, Schumann's Piano Quintet or his Concerto in A minor. One has a tender regard for these things, for in them, we revive the impulses and emotions which elevated, sustained and animated our youthful selves. The medical Romanticists failed through lack of the self-direction and self-discipline which Goethe affirmed

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<sup>22</sup>The only determinism of this kind admissible by realistic historians would be the innate stupidity and fanatical cruelty whereby the human animal has penalized and tortured himself and his fellows through the ages. Thus, Winwood Reade's "Martyrdom of Man" becomes a kind of popular textbook in new countries like Australia, and even the older generation perceived Wotan to be as big a bore as "blaming it upon God." In like manner, the superman of recent vintage is invariably self-appointed and sure to reveal himself as a super-jackass, like the paralytic *Gottmensch* in Dr. André Couvreur's novel: *Je suis le sur-homme! Je suis Dieu!*

<sup>23</sup>Identical in substance with the terminal sentence of Emerson's essay on History. Excellent use is made of this idea in Professor Georg Sticker's learned essay on the prehistory of epidemiology (*Sudhoff Festschrift*. London, 1924, 1-62).

to be essential to substantial, lasting achievement in any direction—

“Vergebens werden ungebundne Geister  
Nach der Vollendung reiner Höhe streben,  
Wer Grosses will, muss sich zusammenraffen;  
In der Beschränkung zeigt sich erst der Meister,  
Und das Gesetz nur kann uns Freiheit geben.”

F. H. GARRISON.

# ANNUAL GRADUATE FORTNIGHT

## Disorders of the Circulation October 19 to 30, 1931

### ADDRESS OF WELCOME\*

JOHN A. HARTWELL

President, The New York Academy of Medicine

The Graduate Fortnight is now established as an integral part of the Academy's educational program. That it has more than local interest is shown by the fact that our guests come from all sections of the United States and from among our friends across the seas.

One is pleasantly impressed with the avidity with which the medical profession grasps every opportunity to raise its efficiency in the fight against sickness. It is now a well accepted axiom that the student days of the doctor are never ended so long as he is in active work and, in many instances, even after that period. There is no place in the rank of our profession for the man who believes that he has accumulated sufficient knowledge to carry on without a constant effort to add to that knowledge. It may be considered as a blessing to the medical profession in these times of particular stress and anxiety, that such is the case. In all periods of economical hardship, the burden that is thrown upon the doctor is enormously increased while his economic compensation for carrying this burden is decreased often to the straining point. The doctor sees himself confronted with the serious problem of balancing the budget. His tradition requires that he shall give his services with scant regard to the budget in such times as these. It is fortunate, therefore, that he

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\*Delivered October 19, 1931.

has the agreeable distraction of forging ahead in his educational development. That these facts are appreciated was demonstrated last week by the gathering in this city of some twenty-five hundred practicing surgeons from all parts of the country, to learn from the leaders of the profession. No one can believe that these men came here without real financial sacrifice. They came because they could learn; and it was a great privilege to see the cheerfulness and courage with which they faced the future.

This gathering is a further demonstration of the same fact and the Academy of Medicine extends to you all a most hearty welcome, with a feeling of satisfaction that it is able to present to you something that appears of real value and that you are so enthusiastic to take part in.

During recent years the Academy has been making an intensive study of the opportunities for the continued education of the doctor in this community. It is deeply concerned to see that, after the medical student receives his degree, there are opportunities as internes in the hospitals which will give him full educational value for the services he renders to his hospital. It is equally concerned to know that, in that most critical period after he has completed his internship, he is not left entirely stranded insofar as educational facilities are concerned. There exist in this community ample facilities for continuing the education of every individual among our younger confreres. It is the responsibility of the Academy to see that these facilities are made available and to stimulate the younger men to utilize them.

Our investigations have shown that there is a capitalization of well over one hundred million dollars for undergraduate medical education and its associated activities, within the boundaries of New York City. In contrast to this there is a pitifully small amount expended upon carrying the doctor forward as an educated practitioner. There are those among us in the Academy who do not hesitate to say that the New York Academy of Medicine should definitely commit itself to this responsibility. The reor-

ganization of our undergraduate medical schools to carry them to their present grade of efficiency entailed many years of intensive work and the expenditure of great sums of money.

I submit for your consideration the proposition that a further step in medical education is equally vital and that the educational leaders must take this burden upon their shoulders and carry it forward so that every practitioner in this community will have the maximum educational equipment that his natural endowments will permit him to attain. This Graduate Fortnight is one of the elements in this program but its scope is necessarily limited and it will mainly act as a stimulus to further endeavor.

In this spirit we welcome you as our Fellows and our Guests, with a certain feeling of pride in what already has been accomplished and a greater feeling of hope for the accomplishments of the future.

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## INTRODUCTORY REMARKS\*

EMANUEL LIBMAN

Chairman, Committee on Graduate Fortnight

Mr. President, guests, Fellows of the Academy, ladies and gentlemen. The members of the Committee on the Graduate Fortnight in whose name I speak this evening, wish to express their appreciation to the officers of the Academy for the privilege of taking an active part in preparing the program of this, the fourth Fortnight. They have had only pleasure in carrying out their duties because of the advanced purposes of the Academy and the enthusiastic and cordial coöperation of medical schools, hospitals and individuals of this country as well as of Canada.

In choosing the subject for the Fortnight several objectives have always been kept in view. Subjects were to be chosen that were of timely interest and for the exposition of which New York City was best prepared. Furthermore, whenever possible, topics were to be preferred which would permit of participation by men engaged in the different branches of medicine. Finally, the educational value to the lay public was to be kept in mind.

The programs of former years permitted participation by men in surgery and the various specialities to a much greater degree than this one. The field of the cardiovascular system was chosen this year because of its great importance and also because this country has so much to offer in the way of contributions to it—not to speak of New York itself as one of the leaders in this branch. Directly the subject was chosen, it was natural for all to think of having Sir Thomas Lewis take the leading part. With his kind acceptance of the invitation of the Academy the success of the Fortnight was assured.

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\*Delivered October 19, 1931.

The activities which begin tonight consist of lectures at the Academy, lectures and clinical demonstrations at medical schools and hospitals and exhibits at the Academy and elsewhere. A suggestion was made to members of the staffs of hospitals that under the auspices of the Academy they invite speakers from outside New York and from local hospitals to participate in the program. This suggestion was cordially received. As a result, hospital programs have become coördinate in importance with those of the Academy, as they should be.

The Exhibit part of the program was initiated last year. The present exhibit as provided by the Committee on Exhibition consisting of Drs. Gross, de La Chapelle and Mond, is an extensive and remarkable one. No such demonstration of the subject of cardiovascular disease has, as far as is known, been presented anywhere. The Committee and the individual exhibitors have done an arduous piece of work which will surely be of great profit to all, and will lend distinction to the Academy. The Committee has arranged to have practical demonstrations by the authors of individual exhibits and continuous demonstrations of all exhibits from two to eleven p.m. by a group of 60 volunteers. Although perhaps not quite correct to single out any individual, we cannot refrain from drawing attention to the generous attitude of Dr. Maude E. Abbott of Montreal, who has come here with an extensive exhibit and who will stay for the entire period of the Fortnight, to teach the embryology of the cardiovascular system and to demonstrate cases of congenital heart disease.

The Exhibit of the literature of the subject of the Fortnight is a very extensive one, going back to the time of Hippocrates. It has been prepared under the supervision of Dr. Malloch, Librarian of the Academy, aided by his staff and Dr. Charles K. Friedberg. This exhibit will be demonstrated at times to be announced in advance.

When one notes not only the great interest manifested by the medical men of the city but also the presence of so many physicians from all over the country and even from



distant points in Canada, one is again impressed with the desire of the medical man to learn. The physician, as of old, is the student and even when he has become the teacher, still remains the student.

The work of the Committee has been much lightened by the building up of a technic by the former Chairmen of the Committee, Dr. Ludwig Kast, who originally suggested the institution of these exercises and Dr. Harlow Brooks, and by Dr. Nellis Foster, Chairman, and Dr. Frederick P. Reynolds, Medical Secretary of the Committee on Medical Education, of which the Fortnight Committee is a subcommittee.

# *The Wesley M. Carpenter Lecture*

## MUSCULAR PAIN IN INTERMITTENT CLAUDICATION\*

SIR THOMAS LEWIS

London

The term intermittent claudication seems first to have been used by Bouley in 1831 to describe a condition of lameness in the horse, developing after a short period of exercise, and caused by obliteration of the main vessels of the limb; his account was followed by that of other veterinarians. In 1846 Brodie and later Charcot noticed a similar condition in human patients suffering from senile arteritis or from aneurysm of the common iliac artery. Erb's collection of clinical and pathological observations led to wide recognition of the malady and served to establish that obstructive arterial disease is the usual anatomical defect and that lameness developing during exercise results usually from pain. It is with the origin of this pain that the present lecture deals.

Charcot's view was that loss of blood supply leads to cramp of the muscles, regarding this cramp as comparable to cadaveric rigidity. Marinesco recognised that the blood supply to the muscles was adequate during rest but not during work. Goldflam and Erb held similar views but referred to the possibility of the pain arising in the arteries themselves. Erb, too, had in mind the possibility of a functional element in the form of vascular spasm, an idea

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\*Delivered before The New York Academy of Medicine, October 20, 1931, in connection with the fourth annual Graduate Fortnight.

The text is an abstract of the lecture. The original observations are published in full in *Heart*, 1931, XV, 359; and were made with Dr. G. Pickering and Dr. P. Rothschild in the Department of Clinical Research, University College Hospital Medical School, London.

which has received support from other writers and has considerably influenced subsequent writings.

The idea that cramp is present when the moving limb becomes painful sprang from early accounts of general rigidity in the affected limb during the attack both in the horse and in man. Usually, however, cramp in the sense of tonic contraction is not described and it is manifest, both from past records and from numerous personal observations, that cramp is unessential to the production of pain. Thus it is not at all clear as yet how ischæmia leads to pain.

In investigating the pain of intermittent claudication, an important step is taken when it is recognised that the pain experienced by our patients can be reproduced exactly in normal limbs to which the blood supply is previously shut off. This conclusion has been formed by Zak, Brown and Allen and others. It is so necessary to be certain of its truth before proceeding, that it has been examined thoroughly in observations including a close comparison in the patient of the abnormal leg with the other leg, the latter being less affected or appearing normal. The muscles of the two legs are given work to do under strictly controlled conditions, and the time at which pain develops and the precise situation and character of this pain are noted. It is found that when the circulation to both limbs is obstructed and they are similarly exercised, pain arises in the two, normal and abnormal, at precisely the same time and in similar situations, and that the pain is of exactly the same kind in both limbs. It is also stated by the patient that the pain reproduced is exactly the same as that produced by walking exercise. In cases in which the disease in the abnormal limb is severe, it is a matter of indifference whether the circulation to this limb is artificially obstructed or not, exactly the same form of pain appears, and, if it does not occur in the usual time period, it is not long delayed. It has also been shown that pain having precisely similar characteristics occurs in normal subjects when the circulation to the limb is obstructed and the mus-

cles are similarly worked. In saying that the pain has similar characteristics, reference is made to the fact that the pain is aching in quality; that it is a continuous pain and that, appearing under circulatory arrest, it continues so long as the bloodflow remains stopped; that the pain is accompanied by local tenderness; that it can be brought about in this or that site by throwing the strain particularly upon this or that group of muscles. Most important of all, the times taken for the pain to begin and to become intolerable are the same in all instances, normal and abnormal, provided that the circulation in the muscles is brought to the same state in all during exercise. These observations clearly prove that the problem of the pain studied is independent of a pathological state of the tissues from which it arises, and that in the patients it is purely a problem of disturbed circulation.

Once it is proved that the pain is identical in patient and in normal subject, the normal subject can be used for further investigation, and it becomes a matter of indifference whether the leg or the arm is used; most of our observations have been upon the forearm.

### *Theory of arterial spasm.*

According to the view especially advocated by Zak, the pain of intermittent claudication is due to spasm of the arteries of the limb, the arterial spasm arising out of ischæmia. Actually this view may be disproved by a simple method. The limb is enclosed in a plethysmograph and the rate at which blood enters it is estimated by the method of Hewlett and Zwaluwenberg. The circulation to the limb is arrested and the arm is worked until severe pain arises in it; at this instant the circulation to the limb is released and the rate at which blood enters is again estimated; it enters at a velocity greatly in excess of the value for the resting limb and it enters at this increased velocity from the instant of release and while pain is still present. It is perfectly clear from these results that the idea that the vessels of the limb are in a state of spasm during the

period of pain is erroneous; on the contrary, they are dilated.

*Pain the product of muscular contraction.*

In further investigating the nature of the pain, a simple device in the form of an isometric recorder has been used. The movement mainly studied has been that of a simple grip, which involves the muscles of the thenar eminence and the muscles of the forearm. It is a movement that can be nicely controlled and is in other ways convenient, the amount of exercise taken is precisely known, the rhythm of movement being usually one contraction a second and the grip maximal or of lesser but known strength. Using this device and proceeding with the test from an adequate preliminary period of rest, the result of exercise with the circulation to the limb stopped is surprisingly constant in the same individual and from one individual to the next. While the beginning of pain may not be very sharply defined, the time at which it reaches its intolerable point is almost critical. It is about a minute and a quarter and it does not usually vary more than a few seconds in repeated tests; the result is so constant for a given set of circumstances that the test may be employed safely in testing the effects of varied circumstances.

A very remarkable fact is that the pain which develops on exercise, while the circulation is arrested, vanishes completely within 2 to 4 seconds of circulatory release, but if exercise ends and the circulation remains arrested, pain persists until the flow of blood returns. The pain persists during circulatory arrest substantially unchanged and at or about the particular intensity to which it has been brought (slight, moderate or severe) during the previous exercise. From these observations we have been led to conclude that the pain under consideration must be determined by a chemical (or physico-chemical) stimulus developed in the muscle mass during its exercise, and that the stimulus is a stable factor during the period of rest.

*Lack of oxygen not the direct factor.*

It is easy to show that the effect of lack of oxygen upon the nerve endings is not directly responsible for pain; thus, a preliminary period of 10 minutes complete obstruction of bloodflow to the limb, causing as it does considerable loss of oxygen, does not diminish the time taken for pain to appear in a succeeding period of exercise. Another and very conclusive experiment is the following. The usual test exercise is continued under circulatory arrest until pain appears and the time is noted. After a period of rest the test is repeated in exactly the same way but the exercise is stopped a few seconds before pain is anticipated. The pain does not develop even if the arterial occlusion is prolonged for a further 5 minutes. If the pain were attributable to lack of oxygen it is clear that at the instant exercise ended the amount of oxygen in the tissues would have declined almost to the necessary level. Yet although during the immediately succeeding period oxygen will still be used up rapidly, owing to the oxygen debt established by the muscles, no pain develops. Thus, the view that in this experiment pain fails to develop simply because oxygen deficiency is not carried far enough, is untenable.

*Pain related to amount of exercise.*

The relation of pain to the amount of exercise taken is easily demonstrated. Firstly, if the rhythm of the contractions remains constant but the tension developed is increased, the beginning of pain is correspondingly expedited; and, secondly, if the tension developed at each contraction is kept constant but the rhythm of contraction is doubled, then the period over which exercise has to be continued to produce pain is approximately halved. The relation of pain to the amount of energy expended is shown by these observations with much precision.

*"Factor P".*

From the experiments so far described, and from further evidence presently to be given, it is concluded that

when muscular exercise is taken in the absence of blood supply it leads to pain, and that the stimulus actually responsible for the pain arises directly or indirectly out of the contraction process; for reasons that will appear later we assume this stimulus to act in the tissue spaces. When muscle contracts, changes such as a release of metabolites occur within its fibres; an obvious possibility is that such metabolites diffuse out and constitute the stimulating agent in the spaces; this conclusion, however, is one that cannot be accepted finally as there are other possible explanations. So it becomes necessary for the moment to keep the relevant changes within and without the fibre as separate ideas, and we shall do so by calling the latter "factor P" because it is the stimulus to pain. So long as there is no bloodflow, "factor P" remains stable; it is cumulative, increasing with each muscular contraction and irrespective of time. It rises first to a level adequate to bring pain, then to higher levels associated with increased pain; being stable during circulatory arrest it maintains the pain between muscular contractions and after exercise has ceased.

### *Recovery.*

The relief of pain on releasing the circulation is not to be interpreted as meaning complete recovery of the underlying process within the muscle fibre, but only that the accumulation of "factor P" has been reduced below the pain level. It can be shown that recovery takes longer; exercise is taken from rest with the circulation stopped and pain is noted to develop to the intolerable point in a given time period; the circulation is released and after a short period of rest is stopped again and the exercise repeated. If various periods of rest are allowed to intervene between tests, it is found that the shorter the period of rest the quicker intolerable pain appears in the subsequent test.

### *Muscular exercise with bloodflow free.*

When exercise is undertaken with the circulation free

there may be a little ache in the arm, but pain of the character here studied does not arise; from this it is unnecessary to conclude that "factor P" fails to develop under these circumstances, since conceivably it rises with contractions and falls in the intervals, and thus fails to reach the pain producing level. From this standpoint it is important to observe that muscular exercise with free circulation shortens the period required to produce pain in the subsequent test.

It has just been shown that during muscular exercise with the circulation undisturbed, a process of accumulation relating to the development of pain occurs, although pain does not appear during that exercise. The accumulation in question is regarded as happening within the muscle fibre; it is not an accumulation of "factor P". From this standpoint a curious phenomenon which we term "latent pain" is relevant. If exercise is undertaken with the circulation free but the bloodflow is arrested at the instant exercise ends, there is no pain, but pain develops after a latent period more or less prolonged and may become not only distinct but severe. This latency cannot be attributed to latency in the formation of "factor P"; for no such delay is suggested by other relevant observations. If the circulation is arrested, "factor P" accumulates to given levels while exercise is proceeding, and is maintained at these levels, whether they are sufficient to be pain producing or not, if exercise ends and the circulatory arrest continues. But if the blood is flowing during exercise, then, although up to a point the chemical changes in the fibre will be cumulative, "factor P" will not necessarily accumulate correspondingly in the tissue spaces or to a level adequate to stimulate the nerves themselves. The latent period from occlusion to the appearance of pain in the experiment above cited is a period during which "factor P" is rising in the tissue spaces to a level corresponding to the state of the fibre. Thus our fuller hypothesis takes the form that a product of muscular contraction is directly or indirectly responsible for pain; that, when successive mus-



cular contractions occur in the absence of bloodflow, the state of the muscle alters progressively and that *pari passu* "factor P" accumulates in the tissue spaces; but that when the muscular contraction occurs in the presence of bloodflow, although the same change happens in the muscle fibre, "factor P" cannot rise to the corresponding level in the tissue space. Quick disappearance of the pain of exercise on release of the circulation is to be interpreted as due to the prompt reduction of the level of "factor P" in the tissue spaces, and not to recovery of the muscle mass as a whole. The ordinary failure of pain to appear in muscular exercise with intact circulation may be attributed to adequate interchange between tissue space and vessel in which bloodflow is rapid.

The purpose of hypothesis is to provide an explanation of the facts, to clear our conceptions, and to act as a basis for future observation. The hypothesis as it stands is directly applicable to cases of intermittent claudication and helps us to understand the phenomena these display. Upon its basis simple tests can be devised that are serviceable in ascertaining the degree in which blood supply to the muscles is deficient. Thus the time taken for pain to develop in a limb under standard conditions of work, and its relation to the time taken when the circulation to this limb is artificially and completely arrested, is clearly important. Another important gauge in similar tests is the rate at which pain subsides from the intolerable point on releasing the circulation, for the greater the returning bloodflow, the quicker will normal conditions become re-established in the tissue spaces.

## RESOLUTIONS ON MEDICINAL ALCOHOL

### PREAMBLE AND RESOLUTIONS ADOPTED BY THE COUNCIL ON MARCH 25, 1931 AND AMENDMENTS

Introduced at the Stated Meeting of April 2. Adopted at the Stated  
Meeting of May 7.

WHEREAS, The Congress has undertaken to fix the doses of wine and whiskey and brandy by legislative fiat, thus taking over a function properly belonging to the pharmacologist and physician, and

WHEREAS, The administration of the Volstead Act compels physicians to betray the confidences of their patients by keeping a record of their diseases and ailments for inspection by Federal Prohibition agents, and thus to violate the traditions of the medical profession, medical ethics and the laws of a number of States, and

WHEREAS, The legislature of the State of New York has enacted into law the Hastings Bill freeing the medical profession from the unwarranted usurpations of the Federal Congress over the control of medical practice, and

WHEREAS, Relief from these conditions has been sought in the courts and has been denied by the United States Supreme Court, and

WHEREAS, The Wickersham Commission has unanimously recommended:

1. "Removal of the causes of irritation and resentment on the part of the medical profession by:
  - a. Doing away with the statutory fixing of the amount which may be prescribed and the number of prescriptions;
  - b. Abolition of the requirement of specifying the ailment for which liquor is prescribed upon a blank to go into the public files;

- c. Leaving as much as possible to regulations rather than fixing details by statute."

Now therefore be it

RESOLVED, that The New York Academy of Medicine hereby formally expresses its disapproval of those portions of the Volstead Act which invade the right of the State of New York to regulate the practice of medicine within its own borders, and which deprive the physician of his right to the free exercise of his judgment in the practice of his profession, and be it

RESOLVED, that The New York Academy of Medicine demands of Congress the repeal of said portions of the Volstead Act, and be it

RESOLVED, that The New York Academy of Medicine urge each of its members to demand of his Senators and Congressman the repeal of said portions of the Volstead Act, and be it

RESOLVED, that The New York Academy of Medicine approves of the Hastings Act, and the return of the entire control of medical practice in the State of New York to the authority of the State, and be it further

RESOLVED, that the Secretary of The New York Academy of Medicine be, and hereby is, instructed to transmit a copy of these Resolutions to the Senators from New York and to each Representative in Congress of the State of New York.

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Phil., Lea, 1931, 359 p.
- Lewis, (Sir) T. Clinical electrocardiography. 5. ed.  
London, Shaw, 1931, 128 p.
- Liotta, M. A. The unborn child.  
N. Y., [Hoss], 1931, 44 p.
- McDonagh, J. E. R. The nature of disease. Pt. 3, sect. 1.  
London, Heinemann, 1931, 391 p.
- Macfie, R. C. Science rediscovers God. [2. ed.].  
Edinburgh, Clark, [1931], 275 p.
- Masters, W. E. The alcohol habit and its treatment.  
London, Lewis, 1931, 190 p.
- Meredith, W. C. J. Insanity as a criminal defence.  
Montreal, Wilson, 1931, 146 p.
- Morley, J. Abdominal pain.  
Edinburgh, Livingstone, 1931, 191 p.
- Nattrass, F. J. The commoner nervous diseases.  
London, Milford, 1931, 218 p.
- O'Malley, I. B. Florence Nightingale.  
London, Butterworth, [1931], 416 p.
- Piette, E. C. Textbook of histology for medical and dental students.  
Phil., Davis, 1931, 466 p.
- Pitt, J. N. U. Curiosities of heredity; "The Hapsburg lip."  
London, Bale, 1931, 24 p.
- Price, J. P. The young doctor thinks out loud.  
N. Y., Appleton, 1931, 186 p.
- Recent advances in microscopy; biological applications. Edited by A. Piney.  
London, Churchill, 1931, 260 p.
- Reik, T. Ritual, psycho-analytic studies.  
London, Woolf, 1931, 367 p.
- Review (A) of the effects of alcohol on man.  
London, Gollanez, 1931, 300 p.
- Robertson, J. D. Gastric acidity, an historical and experimental study.  
London, Murray, [1931], 76 p.
- Royal Anthropological Institute of Great Britain & Ireland. Early man,  
his origin, development and culture. . . . Lectures.  
London, Benn, 1931, 176 p.
- Schalek, A. Fundamentals of dermatology. 2. ed.  
Phil., Lea, 1931, 247 p.
- Siegrist, A. Die skrofulöse Augenentzündung.  
Berlin, Urban, 1931, 68 p.
- Smith, S. Forensic medicine. 3. ed.  
London, Churchill, 1931, 631 p.
- Stevens, T. G. Diseases of women. New ed.  
London, Univ. of London Pr., 1931, 444 p.

Thiel, R. Männer gegen Tod und Teufel.

Berlin, Neff, 1931, 415 p.

Thomsen, O. Antigens in the light of recent investigations.

Copenhagen, Levin, 1931, 187 p.

Thurstone, L. L. and Jenkins, R. L. Order of birth, parent-age and intelligence.

Chic., Univ. of Chic. Pr., [1931], 135 p.

Traité de la syphilis, publié sous la direction de Ed. Jeanselme.

Paris, Doin, 1931, v. 1-2.

Trattato della tubercolosi, diretto dal L. Devoto.

Milano, Vallardi, 1931, v. 1.

Tuberculosis, its treatment and cure with the help of umckaloabo (Stevens).

London, Fraser, [1931], 153 p.

Turner, (Sir) G. R. Unorthodox reminiscences.

London, Murray, [1931], 343 p.

Warwick, W. T. The rational treatment of varicose veins and varicocele.

London, Faber, 1931, 188 p.

Wolman, A. and Gorman, A. E. The significance of waterborne typhoid fever outbreaks, 1920-1930.

Balt., Williams, 1931, 82 p.

# PROCEEDINGS OF ACADEMY MEETINGS

## OCTOBER

There was no Stated Meeting of the Academy on October 1.

### THE HARVEY SOCIETY

In affiliation with

### THE NEW YORK ACADEMY OF MEDICINE

Thursday Evening, October 15, at 8:30 o'clock

### THE FIRST HARVEY LECTURE

"THE HORMONE OF THE SUPRARENAL CORTEX"

W. W. SWINGLE, Princeton University

(This lecture takes the place of the Stated Meeting of the Academy.)

JAMES W. JOBLING, President Harvey Society

DAYTON J. EDWARDS, Secretary Harvey Society

## SECTION MEETINGS

### SECTION OF SURGERY

Friday Evening, October 2, at 8:30 o'clock

#### ORDER

- I. READING OF THE MINUTES
- II. PRESENTATION OF CASES
  - a. 1. Gangrenous intussusception. Resection
  2. Elephantiasis of left upper extremity. Kondolean operation, R. Franklin Carter
  - b. A case of ruptured gastric ulcer complicated by embolic abscesses to the lung and liver. Operation for liver abscess, Ben-Henry Rose
  - c. 1. Non-union in fracture of the tibia—open operation. End result (two cases)
  2. Fracture of os calcis, bilateral. End result
  3. Open reduction for ununited compound fracture, second metacarpal. Intermediate result
  4. Open reduction for mal-union fracture shaft of femur. End result, Herbert Bergamini
- III. PAPER OF THE EVENING  
A Bacteriological study of chronic ulceration in relation to carcinoma, Edward W. Saunders
- IV. DISCUSSION OPENED BY Joshua E. Sweet
- V. EXECUTIVE SESSION  
Report of the committee on qualifications for Fellow in Surgery. This report has been mailed to each member of the Section for his consideration. Action will be taken at this meeting.



SECTION OF DERMATOLOGY AND SYPHILOLOGY  
Tuesday Evening, October 6, at 8:30 o'clock

ORDER

- I. READING OF THE MINUTES
- II. PRESENTATION OF CASES
  - a. Cases from the Vanderbilt Clinic
  - b. Miscellaneous cases
- III. GENERAL DISCUSSION
- IV. EXECUTIVE SESSION

SECTION OF PEDIATRICS

Thursday Evening, October 8, at 8:30 o'clock

Instead of the regular October meeting of the Section, a combined meeting was held in Philadelphia of the Section with the Philadelphia Pediatric Society and the New England Pediatric Society, on this date.

SECTION OF NEUROLOGY AND PSYCHIATRY  
Tuesday Evening, October 13, at 8:30 o'clock

ORDER

- I. READING OF THE MINUTES
- II. PRESENTATION OF CASES
  - a. Brain tumor simulating epidemic encephalitis, Rubin A. Gerber
  - b. Charcot-Marie-Tooth type of neuritic atrophy in a family group, George A. Blakeslee (by invitation)  
Discussion, B. Sachs
- III. PAPER OF THE EVENING  
The problem of cerebral dominance in the acquisition of language function, Samuel T. Orton (by invitation)
- IV. DISCUSSION, Michael Osnato, B. Sachs, Foster Kennedy
- V. EXECUTIVE SESSION  
Discussion of qualifications for Fellow in Neurology and Psychiatry, based on report of the Advisory Committee.  
Members were requested to present their views and enter into this discussion.

JOINT MEETING  
of the

SECTION OF OTO-LARYNGOLOGY  
and the

AMERICAN COLLEGE OF SURGEONS

Tuesday Evening, October 13, at 8:30 o'clock

ORDER

- I. READING OF THE MINUTES
- II. PRESENTATION OF CASES
- III. PAPERS OF THE EVENING
  - a. An outline of the activities of the Otological Research Laboratory of the Johns Hopkins University during the past five years, Samuel J. Crowe, Baltimore (by invitation)  
Discussion, Edmund P. Fowler (by invitation)

- b. Some intimate studies of nasal function; their bearing upon diagnosis and treatment, Arthur W. Proetz, St. Louis (by invitation)  
Discussion, S. H. Pike, Ph.D., Columbia University (by invitation)

IV. GENERAL DISCUSSION

V. EXECUTIVE SESSION

Appointment of Nominating Committee

JOINT MEETING

*of the*

SECTION OF OPHTHALMOLOGY

*and the*

AMERICAN COLLEGE OF SURGEONS

Wednesday Evening, October 14, at 8:30 o'clock

*(Please Note Change in Date)*

ORDER

- I. READING OF THE MINUTES
- II. A SYMPOSIUM ON INDUSTRIAL INJURIES OF THE EYE AND ORBIT
  - a. The clinical phase, Edward B. Heckel, Pittsburgh (by invitation), George H. Cross, Chester, Pa. (by invitation), E. S. Sherman, Newark, Henry S. Miles, Bridgeport
  - b. Pathological specimens, Bernard Samuels
  - c. On workmen's compensation problems of interest to ophthalmologists, Mr. V. A. Zimmer, Director, Division of Workmen's Compensation, Department of Labor, N. Y. State (by invitation)
  - d. On the subject of prevention of industrial accidents to the eyes and orbits, Mr. Louis H. Carris, Director of the Society for the Prevention of Blindness (by invitation)
- III. EXECUTIVE SESSION

SECTION OF ORTHOPEDIC SURGERY

Friday Evening, October 16, at 8:30 o'clock

ORDER

- I. READING OF THE MINUTES
- II. PAPERS OF THE EVENING
  - a. Open reduction in congenital dislocation of the hip. Report of 72 cases with case presentations, M. B. Howorth (by invitation)
  - b. Open operations for congenital dislocation of the hip with case presentation, Paul C. Colonna
  - c. Closed reduction of congenital dislocation of the hip. Report of 25 cases with case presentations, Francis Joseph Carr (by invitation)
- III. DISCUSSION
  - Opened by H. P. H. Galloway, Winnipeg (by invitation)
- IV. EXECUTIVE SESSION

SECTION OF MEDICINE

Tuesday Evening, October 20, at 8:30 o'clock

ORDER

*Program arranged in conjunction with the*

FOURTH ANNUAL GRADUATE FORTNIGHT

1. Relation of heart disease to operations, Alfred Stengel, Professor of Medicine, University of Pennsylvania
2. THE WESLEY M. CARPENTER LECTURE:  
Intermittent claudication, Sir Thomas Lewis, London

SECTION OF GENITO-URINARY SURGERY

Wednesday Evening, October 21, at 8:30 o'clock

A program was arranged on this evening for the Graduate Fortnight by courtesy of the Section of Obstetrics and Gynecology. No meeting of the Section, therefore, was held in October. (See Graduate Fortnight program)

SECTION OF OBSTETRICS AND GYNECOLOGY

Tuesday Evening, October 27, at 8:30 o'clock

A program was arranged on this evening for the Graduate Fortnight by courtesy of the Section of Obstetrics and Gynecology. No meeting of the Section, therefore, was held in October. (See Graduate Fortnight program)

NEW YORK MEETING

*of the*

SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE

Under the auspices of

THE NEW YORK ACADEMY OF MEDICINE

Wednesday Evening, October 21, at 8:15 o'clock

1. Abortive Poliomyelitis, S. D. Kramer and W. L. Aycock (introduced by Benjamin Kramer)
  2. Purification of Poliomyelitis Virus by Absorption and Elution, A. B. Sabin (introduced by W. H. Park)
  3. A Recently Described Virus Disease of Parrots and Parrakeets Differing from Psittacosis, T. M. Rivers
  4. Vaccination of Humans Against Yellow Fever with Immune Serum and Virus Fixed for Mice, W. A. Sawyer, S. F. Kitchen and W. Lloyd (introduced by T. P. Hughes)
  5. Cultivation of the Virus of the Common Cold in Tissue Medium, A. R. Dochez, K. C. Mills, and Y. Kneeland, Jr.
  6. Depression of the Vomiting Mechanism by Digitalis, H. Gold, N. Kwit, and J. Travell
  7. Liver Changes after Deprivation of External Pancreatic Secretion, B. N. Berg and T. F. Zucker
  8. Local Cerebral Anaphylaxis in the Dog, L. M. Davidoff and N. Kopeloff
- DAYTON EDWARDS, President A. J. GOLDFORN, Secretary

## FELLOWS ELECTED NOVEMBER 5, 1931

Dorothy H. Anderson.....	187 Pinehurst Avenue
George Anopol.....	30 East 40 Street
Leo M. Davidoff .....	6 East 85 Street
E. Perey Eglee .....	105 East 53 Street
Elmer S. Gais .....	151 East 83 Street
Charles A. Greenhouse.....	1401 Grand Concourse
Bart Mulford James.....	Bernardsville, New Jersey
Claus W. Jungeblut.....	6 Windsor Rd., Hastings, N. Y.
Joseph Levine.....	113 East 61 Street
Leon S. Loizeaux.....	4 East 88 Street
Evan W. McLave.....	30-44 37 Street, L. I. City
John A. P. Millet.....	770 Park Avenue
C. J. F. Parsons.....	Dobbs Ferry, New York
Robert E. Pound.....	118 Ritchie Drive, Yonkers, N. Y.
Elaine P. Ralli.....	75 East 55 Street
Thomas M. Rivers.....	Rockefeller Institute
Paul F. Schilder.....	52 North Gramercy Park
Anthony Wollner.....	1015 Lexington Avenue

## ASSOCIATE FELLOWS ELECTED NOV. 5, 1931

Ross A. McFarland, Ph.D.....	88 Morningside Drive
Richard H. Paynter, Ph.D.....	395 Grand Avenue, Brooklyn

## DEATHS OF FELLOWS OF THE ACADEMY

EMIL MAYER, M.D., 320 West 89 Street, New York City; graduated in medicine from New York University, in 1877; elected a Fellow of the Academy April 7, 1892; died, October 20, 1931. Dr. Mayer was a Fellow of the American Medical Association, a member of the County and State Medical Societies, a member of the American Laryngological, Rhinological and Otological Societies, a member of the American Academy of Ophthalmology and Oto-Laryngology, a member of the American Bronchoscopy Society, and Consulting Laryngologist to Mt. Sinai Hospital, also Chief of the clinic of the Nose and Throat Department of that Dispensary. He was at various times adjunct Professor to the Polyclinic Hospital, Surgeon and Chief of the Throat clinic to the New York Eye and Ear Infirmary and during the World War Dr. Mayer was Chief of the Medical Intelligence Bureau of the American Red Cross. He was also editor of the "Centralblatt fuer Laryngologie" and contributed many articles to the literature of his specialty.

GEORGE WATSON ROBERTS, M.D., 26 West 54 Street, New York City; graduated in medicine from the New York Homeopathic Medical College, in 1889; elected a Fellow of the Academy November 1, 1923; died, October 14, 1931. Dr. Roberts was a Fellow of the American Medical Association, a Fellow of the American College of Surgeons and a member of the County and State Medical Societies. He was Consulting Surgeon to Fifth Avenue Hospital, New York, also St. Mary's Hospital in Passaic and Ann May Memorial in Spring Lake, New Jersey.

# BULLETIN OF THE NEW YORK ACADEMY OF MEDICINE

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DECEMBER, 1931

No. 12

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## EDITORIAL

### HERBALS AND BESTIARIES

Descriptions of animals and plants go back to the earliest times and were first conveyed by the graphic arts. Aurignacian man was so skilled as sculptor, fresco painter and engraver on bone and stone that his representations of bison, stags, chamois and salmon are easily identifiable as such and the same thing is true of the animals figured on Egyptian and Assyro-Babylonian bas reliefs. The Assyro-Babylonian lions are unforgettable in respect of dramatic interest. The Egyptian mules have the wicked humorous eye of the mule, the gazelles are unmistakable gazelles, while cobra and ibis are recognizable even in the hieroglyphs. The Cretan bulls, squid and sub-tropical fish are equally life-like. The prehistoric artist was thus the first descriptive zoölogist. In fact, the Greek designation for a painter was "zoögrapher" (*zoographos*). Plants, as not being very plentiful in the inter-glacial periods, or not generally noticed as useful to man, were not represented to any extent before the rise of classical antiquity. The single exception is the primitive wild wheat (*Tritum dicoccum*) of the Mesopotamian plain, which figures in the carvings of Oriental tombs, and with the different species of barley (*Hordeum*), forms a prominent decorative device on later Greek coins, vases, tombs and altars (Pergamon).<sup>1</sup> The Greek coins show very recognizable species of such plants and fruits as the rose, lily, ivy, pars-

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<sup>1</sup>See P. Wolters: *Gestalt und Sinn der Aehre in antiker Kunst. Die Antike*, Berlin and Leipzig, 1930, VI, 281-301.

ley, grape-vine, apple, quince, pomegranate, poppy, barley, wheat, olive, date-palm, fan-palm, laurel and oak, and of such animals as the horse, dog, sheep, goat, bull, hare, lion, hippopotamus, dove, rooster, turtle, squid, crab, frog and bee.<sup>2</sup> Greek vases show the correct dentition of the lion, the specific characters identifying the sea eagle and Mediterranean fishes.<sup>3</sup> On the textual side, there is sufficient evidence of an Egyptian vegetable materia medica in the prescriptions of the Ebers Papyrus, while a respectable Assyrian Herbal, compiled from the cuneiform inscriptions on 120 baked brick fragments, was published by Campbell Thompson in 1924. The Assyrians knew of some 250 vegetable remedies. A list of 73 plants in the garden of Merodach-Baladan II, King of Babylon (721-702 B. C.) is inscribed on a small clay tablet (No. 46226) in the British Museum.

The culmination of all this was the genuinely scientific natural history of Aristotle and Theophrastus, whose descriptions of animals and plants remained unsurpassed up to the Renaissance. Aristotle was the first scientific zoölogist, Theophrastus the earliest systematic botanist. In the first century of the Christian era, Dioscorides compiled the first materia medica. What happened in the long interim between the decline of classical antiquity and the Revival of Learning? Under the spell of Dioscorides, who classified plants by their medicinal properties rather than their botanical characters, and of Pliny, who substituted a fanciful folklore of plants and animals for the more accurate notations of his great predecessors, the Dark and Middle Ages were to be dominated by two distinct species of popular picture books on natural history, the Herbals and the Bestiaries. After the Assyro-Babylonian herbal, the earliest Greek exemplar of this species

<sup>2</sup>O. Bernhard: *Pflanzenbilder auf griechischen und römischen Münzen*, Zürich, 1924. P. R. Gaetgens: *Warum und wie sammelt man Münzen und Medaillen?* Halle, 1926, plates XVII-XVIII.

<sup>3</sup>Morin-Jean: *Le dessin des animaux en Grèce d'après les vases peints*. Paris, 1911. Cited by Singer.

was that of Diocles of Carystos (350 B. C.) which exists only in fragments, edited by Max Wellmann (1901-3). The ninth book of Theophrastus is also a virtual herbal, but compiled from later Alexandrian sources (250 B. C.). In the time of Mithridates of Pontus (120-63 B. C.), the botanist Cratenas compiled his *Rhizotomikon*, the earliest known herbal assumed to have been illustrated. Eleven drawings by Cratenas<sup>4</sup> probably survive in the early Greek codices of Dioscorides, notably the Julia Anicia (512 A. D.) or Constantinople Codex (St. Mark's Library, Venice) and the Cheltenham Codex of the 10th Century, now in the Pierpont Morgan Library (New York). The Greek text of Dioscorides was translated into Latin in the 5th-6th Century A. D. for the use of the monks at Squillacio. The earliest MS. extant, known as the Lombard Dioscorides, also beautifully illustrated, was made at Monte Cassino in the 9th Century. It contains descriptions of 71 herbs and their properties, adapted from Dioscorides, from a spurious 4th Century Latin herbal attributed to Apuleius and from the botanical chapters in Pliny. This mixture of debased elements and overlaid material is also characteristic of the spurious 9th Century MS. at Rome, known as pseudo-Dioscorides (*De herbis femininis*), a hodge-podge probably compiled in Italy during the 5th-6th Centuries A. D.; and the Vienna palimpsest of 600 A. D., designated by Singer as *Dioscorides vulgaris*, which was first printed at Colle, near Siena, in 1478 and later at Leyden (1512). From these three composite Latin texts, the Lombard Dioscorides, pseudo-Dioscorides and *Dioscorides vulgaris*, came much of the base metal in the mediæval herbals.<sup>5</sup> The dominating influence was Pliny's Natural History, of which chapters XX-XXV constitute the best known Latin herbal of the first Century after Christ, a series of paragraphic statements deriving from Theophrastus and teeming with errors and superstition. The

<sup>4</sup>Restored by C. Singer in: *Jour. Hellenic Studies*, London, 1927, XLVII, 8-17.

<sup>5</sup>Charles Singer: The Herbal in Antiquity. *Jour. Hellenic Studies*, London, 1927, XLVII, 1-52.



next most important Greek herbal after Dioscorides was the list of drugs and their uses in Books VI-VIII of the *De simplicibus* of Galen. The plants are paragraphed in alphabetical order, with mention of the locality in which each flourished, its differential characters and medicinal uses. The plant is seldom described in full. This alphabetical arrangement (each plant ticketed off as in an auctioneer's catalogue) was to become the pattern for the shorter mediæval herbals, some of which were cast in hexameter verses. Herbals or botanic treatises were also attributed to Herophilus, Andreas of Carystus, Sextius Niger, Pamphilus and Tiberius Claudius Menecrates, to whom Max Wellmann allocates the Greek original of Celsus; but these texts have all been lost. There was a Syriac Herbal, which was virtually a 6th-7th Century translation of Books VI-VIII of Galen's *De simplicibus*. There was the great Arabic Herbal of Ibn Baitar (died 1248), containing the names of nearly 800 plants. There is a bilingual list of plants in Coptic and Arabic, and the equivalent of an Ethiopic or Abyssinian Herbal in the British Museum.<sup>6</sup> But the great mass of MS. Herbals up to the 16th Century was of European provenance, and derived, as we have seen from Dioscorides, Pliny and pseudo-Apuleius. In the family-trees of these compilations which Singer has traced,<sup>7</sup> one group of alphabetic lists of plants in Greek is seen to derive from the text of the *Rhizotomikon* of Crateuas *via* an anonymous intermediary. A non-alphabetic group derives directly from the text of Dioscorides, appropriates the illustrations (plant-types) of Crateuas, with a secondary alphabetic offshoot; while a Latin group derives from Dioscorides Lombardus and Dioscorides vulgaris. The Greek original of the Latin Herbal of pseudo-Apuleius (4th Century A. D.) was probably akin to the text of a papyric fragment discovered in Egypt by Johnson in 1904 and is probably assignable to the same period (400 A. D.). The Latin descendants of

<sup>6</sup>For which see Sir E. Wallis Budge: *The Divine Origin of the Craft of the Herbalist*. London, 1928.

<sup>7</sup>Singer: *op. cit.*, 20, 35.

pseudo-Apuleius comprise a South-Italian group, a Germanic group and an Anglo-Norman group, the figures being like those in the Johnson Papyrus. Two Parisian MSS. of the 9th Century represent combinations of the Herbal of pseudo-Apuleius with *Dioscorides vulgaris*. In the 11th Century, the Anglo-Saxon codex of pseudo-Apuleius was combined with an Anglo-Saxon version of the Latin Dioscorides. The figures in this Anglo-Saxon herbal are very like those in certain Latin MSS. of pseudo-Apuleius, formerly at Monte Cassino, while a third variant of these two MSS. was the original of the first edition of pseudo-Apuleius, printed at Rome by Philip de Lignamine about 1481. The figures in this incunable make it the closest relative known of the 11th Century Anglo-Saxon Herbal in MS. (Singer). The plant-lore of these English herbals is taken mostly from Pliny: the illustrations of plants are mainly servile copies from South Italian originals, with one remarkable exception. In the Bodleian, at Oxford, is an Anglo-Saxon MS. made at Bury St. Edmunds in 1120, and containing life-like, naturalistic free hand drawings of actual English plants. This stands quite alone in scientific interest. The Anglo-Norman MSS. in the Ashmolean (Oxford) and Sloane (British Museum) collections are gorgeously illuminated, but the drawings are again stiff, trite patternwork. The Latin Dioscorides was also the original of the *Circa instans* of Matthæus Platearius (12th Century), which engendered in turn the text of the *Arbolayre*, the first French Herbal in the vernacular, printed at Besançon by Peter Metlinger about 1490. It passed through at least four successive editions between 1500 and 1535, under the title of *Le Grant Herbier*. The *Arbolayre* was illustrated with original cuts formerly used in the German *Gart der Gesundheit* (Klebs). The first English illustrated herbal, called the *Groete Herball*, printed by Peter Treveris at London in 1526, was a translation of the *Arbolayre*. One of the most charming of the early German forerunners of the herbal was the *Hortulus* of Walafrid Strabo (809-849), a hexameter poem describing the plants in the garden of the Cloister at Reichenau, which was com-

posed in 827, printed at Vienna in 1510 and edited in modern facsimile by Sudhoff (1927). It was translated into English by R. S. Lambert as "Hortulus or The Little Garden" (London, 1924). Sudhoff likens it to a solitary floweret, plucked by the wayside *en passant*.

The first authentic herbal to be published in Germany was the Latin *Herbarius Moguntinus*, printed by Peter Schoeffer at Mainz in 1484. It consists of descriptions of 150 German garden plants, illustrated by 150 wood cuts, followed by separate accounts of 96 drugs. The names of the plants are given in Latin and German. The work is a compilation from classical, Arabic and Mediæval writers, and as Arnold Klebs points out, was "the prototype for the greater part of all herbals printed in Germany, as well as in Italy, France and Holland during the 15th Century."<sup>8</sup> It was reprinted at Mainz, Speyer and Louvain during the year of its initial publication (1484) and passed through ten subsequent editions during 1485-1520, and seven Italian translations, under the title *Herbolario volgare* (1522-65). As Klebs observes, it was Schoeffer's curtain-raiser for a more momentous enterprise, the *Gart der Gesundheit* (Mainz, Peter Schoeffer, 1485), an entirely independent compilation in the vernacular, comprising 435 chapters covering the entire known pharmacopœia of the period, with nearly 400 new illustrations, which constitute a land-mark in the depiction of plants from nature. It passed through 18 German editions (1485-1530), a low German version (*Gærde der Suntheit*, Lübeck, 1492), and five editions of a Dutch version (1514-47). The Latin *Hortus sanitatis*, the next most important German herbal, is not a translation of the *Gart der Gesundheit*, as commonly supposed, but contains 1066 chapters, of which 530 are on plants and the rest on animals, birds, fishes, stones, and minerals and the urine, followed by a long index of the therapeutic indications of the plants described (Klebs). The illustrations, 1066 in number, include 379

<sup>8</sup>For Klebs' final exegesis of the German Herbals, see his *Catalogue of Early Herbals*, Lugano, L'Art Ancien, 1925.

of the pictures of plants from the *Gart der Gesundheit* and 151 newer drawings. The first edition was printed by Jacob Meydenbach at Mainz in 1491 and was followed by four Strassburg editions (1497-1517), two Venetian reprints (1511-38) and two French translations (Paris, 1500-29). From these three German herbals, it is but a step to the magnificent illustrated tomes of the German Fathers of Botany, Brunfels, Fuchs, Egenolph and Bock (1530-60). But with the advent of these men, we are already in the full current of the scientific botany of the Renaissance. From the Salernitan hexameter herbal of Macer Floridus came the two Danish herbals of Henrik Harpestreng (13th Century), but consideration of the Scandinavian and Russian herbals would lead us too far. In the Orient, Dioscorides was translated into Arabic in 854, again about 951, and into Syriac by Bar Hebraeus about 1250. There are several Arabic MSS. of Dioscorides, containing illustrations germane to Oriental flora. Dioscorides is to this day the current materia medica of the Islamic world (Singer).

In the pharmacopœias of Western Europe, the great influence of Galen was still paramount, even well into the 18th Century, when vegetable simples were still called Galenicals. But with the advent of the scientific botany of the Renaissance, the herbal had really outlived its period of usefulness. Its spirit lingers on in the plant-lore of primitive peoples, in such American survivals as Thomsonianism, and in the mentality of the herb-doctor himself, as adumbrated by Singer:

"Scattered here and there among the meaner streets of our great cities are shops bearing over the window the word *Herbalist*. In these little dens of bygone superstition the artless folklorist sometimes seeks for remnants of early English folk belief. Such remnants are, in fact, surprisingly rare and few. If he enter in search of them the innocent inquirer will either be disappointed or, if satisfied, he will be deceived. The lore that the out-at-elbow practitioner purveys to him is not that of the ancient Anglo-Saxon, whose medical system was too debased or too primitive to survive. It is rather the misunderstood and misinterpreted remains of Pliny and Apuleius, of Dioskurides and Galen, perverted at fortieth hand. Our herbalist's methods are tinged too with Astrology. As like as not his

whole library consists of one of the numerous descendants of Nicholas Culpepper's *English Physician Enlarged* of 1643. This poor, shabby and pretentious fellow, half deceived and half deceiver, is the descendant of Diokles of Athens and Krateuas of Pontus. Their lore has come to him through the ages in an unbroken though contaminated line."<sup>9</sup>

Of far different origin and significance were the Bestiaries or Beast-Books, which stemmed from that strange 4th Century picture-book known as the *Physiologus*. According to the recent exegesis of Max Wellmann,<sup>10</sup> the *Physiologus* originated in Caesarea (Syria) about 370 A. D. and is compounded of Egyptian, Indian, Arabian, Libyan, Jewish and Greek elements derived variously from the book on animals (*Peri zoön*) of Timotheus of Gaza (5th-6th Century), the *Koiranidae* of the Syrian Hermes Trismegistus (1st Century), the *Hieroglyphica* of Herapollon (4th Century) and from the fragments of Democritus, as filtered through the *Physica* of Bolos (1st Century). These sources Wellmann then traces back to remoter originals, viz., Timothy of Gaza to the Syrian *Peri zoön* of Tatian (2nd Century), the Hermetic *Koiranidae* to the neo-Pythagorean philosopher, Anaxilaus of Larissa (28 B. C.), Herapollon to Chairemon and Bolos, and Bolos to Anaxilaus. These in turn derive from Aristotle, Theophrastus, Herodotus, Juba and Pliny. The immediate model of the *Physiologus* was a shadowy *Physica* of Didymus of Alexandria (4th Century). It is not proposed to go into the complex web of parallel citations, deductions and conjectures by which Wellmann arrives at these conclusions. Let us now consider the *Physiologus* itself. Conceived by a Christianized Greek in Syria, translated into all languages and exerting immense influence upon the ecclesiastical art and general culture of the Middle Ages, its earliest known versions are the Syriac and the Ethiopic (5th Century, A. D.), its latest an Icelandic translation of the 13th Century. The most instructive Greek text is the so-called Smyrna or Byzantine *Physio-*

<sup>9</sup>Singer: *op. cit.*, 50.

<sup>10</sup>Wellmann: *Der Physiologus: eine religionsgeschichtlich-naturwissenschaftliche Untersuchung*. Leipzig, 1930.



## THE LION

The Naturalist says the Lion has three traits: First, when pursued, he wipes out his tracks with his tail, so that huntsmen may not follow him to his lair or hiding place. So, too, the divinity of Christ was concealed after the Annunciation and the Incarnation. Second, he sleeps with his eyes open: an allegorical symbol of the Crucifixion. Third: his cubs are born dead, but resuscitated on the third day when the male parent roars over them: an allegorical symbol of the Resurrection.

## THE LIZARD

When the Lizard gets old, it becomes blind, but by sunning itself through a crevice in a wall facing to the East, it becomes young again. So let man, in his blindness, seek Christ.

## THE ANT

The Naturalist says of the ant: it has three peculiarities: 1. If it lacks corn, it will not disturb another ant bearing a grain, but will go and fetch one for itself: Parable of the Wise and Foolish Virgins. 2. It bites each kernel of corn, so that it may not germinate, and so provides for the winter. Do thou also distinguish the spirit of the Gospel from the letter, lest it destroy thee. 3. It gathiers wheat and shuns barley. So, hold thou fast to the true faith.

## THE FOX

The Naturalist says of the fox: when hungry, it feigns death and so catches birds that light upon it to feed; and such are the wiles of the Devil.

So also, the Phoenix, which arises on the third day from its own ashes, symbolizes the Resurrection, the Unicorn, which only permits itself to be captured on the lap of a pure virgin, stands for the Incarnation, the Pelican, which feeds its young with its own blood, typifies the salvation of mankind by the Crucifixion. All this was germane to the many metaphors about animals in the Bible, such as the deaf adder, the little foxes, the Paschal Lamb, and was reëchoed in such literary allusions as "crocodile tears" or the bear licking her cubs into shape. Allusions from the *Physiologus* are easily found in Dante, Cervantes, Shakespeare and the elder poets and dramatists. The unicorns, griffins, leopards and panthers found their way into heraldry, the phoenix is even now a symbol of fire insurance, while the illustrations in the *Physiologus*, particularly the more fanciful beasts, became the staple of the gargoyles on mediæval cathedrals, of which Viollet le Duc affirmed that

no two were ever alike. A fairly complete Bestiary is said to be carved around the south doorway of Alne Church in Yorkshire. Another is painted on part of the nave of St. Savin le Mont. Meanwhile, animals, plants, and even the human skeleton and visceral *schema*, came to be depicted with ever increasing skill by the miniature painters of the Books of Hours and in the MSS. illustrations of such books as Bartholomew de Glanvil's *De proprietatibus rerum*.<sup>12</sup> By the time that Leonardo was finishing his wonderful anatomical drawings, the spirit of the scientific botany and zoölogy of Theophrastus and Aristotle had been re-awakened. Before the second edition of Vesalius had been published (1555), scientific comparative anatomy had already got its stride in such illustrated books on zoölogy as those of Pierre Belon (1551), and Guillaume Rondelet (1554). In 1575, we have Volcher Coiter's serial illustrations of comparative osteology, by 1598 Carlo Ruini's Anatomy of the Horse, by 1601, such things as Casserius' plate showing the ossicles of the ear in man, the calf, the horse, the dog, the cat, the hare, the goose, the mouse and the pig. Childish as the reasoning, puerile as the drawings, the Herbals, the *Physiologus* and the Bestiaries have their place in this continuity—the only substitutes for botany and zoölogy the Dark and Middle Ages had.

In a charming lecture on the Bestiary,<sup>13</sup> Dr. Montague R. James, the learned Provost of Eton, summarizes as follows:

"When you see a griffin on a crest or supporting a coat of arms, or an antelope, or a pelican plucking at its breast, or a phoenix on a Life Insurance badge, or, most familiar of all, a unicorn, you are looking at something which but for the Bestiary would not have been there."

And the probable reason for the appearance of these creatures on the seals of great nations or the armorial bearings of noble families was that they were emblems of

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<sup>12</sup>Note the remarkable drawings of animals and plants from a MS. of 1482 on pl. XI in Charles Singer's *Studies in the History of Science*, Oxford, 1921, II, opposite p. 38.

<sup>13</sup>M. R. James: *History*, Lond., 1931, n. s., XVI, 1-11.



the ethical and religious allegories attaching to them in the age-old *Physiologus*. As to the cast of mind which brought all this about, Dr. James is of opinion that "it can plausibly be compared to the child's mind, but the mediæval people were not children. The fact is," he goes on to say, "that to them the accurate observation and investigation of nature had not begun to seem important by comparison with matters of conduct and religion, not to speak of war, law and art." This is unquestionably true, but the astonishing thing about the peoples of the Middle Ages is, not so much their mental limitations, as the persistence of this mental backwardness in certain branches of science for a thousand years, from the downfall of the Western Roman Empire to a period well beyond the fall of Constantinople, the invention of printing and the discovery of America. Considering the tiny *Hortulus* of the Abbot of Reichenau to the pensive melody of Schumann's *Einsame Blumen*, one recalls Osler's phrase about "the long night of the Middle Ages." For all this, many ingenious reasons have been assigned—the aspiration of the different tribal groups toward nationhood, the Feudal System, religion,<sup>14</sup> the mediæval concept of the State, the wars, epidemics and famines of the times, but if anything is to be blamed for the phenomenon, it would be the limited, fallible and unreliable nature of the human mind itself, of which recent humanity has had abundant experience since the World War. In the matter of aspiration toward nationhood, Germany and Italy did not attain to national unity until 1870, and Russian science was vir-

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<sup>14</sup>Max Wellmann (*op. cit.* 115) takes this line ("*Die Schuld trifft die Religion*") and traces the mystical elements in literature of the *Physiologus* type to the neo-Pythagorean monks in Egypt, from whom it was copied by the Essenes in Palestine and the Hermetics in Egypt and Syria. In his terminal sentence, he denounces the heathen and Christian monkish orders of these times as "the executioners of natural science in antiquity" (*die Henker der naturwissenschaftlichen Naturerkenntnis im Altertum*). This, however, does not entirely account for the popularity of the *Physiologus* for over a thousand years. The true explanation is the almighty power of tradition (Sudhoff), in other words, the disinclination of the human mind, in certain periods, to overcome inertia and venture into untried paths.

tually non-existent for nearly eighteen centuries after the birth of Christ. The fundamental error of Waitz's Anthropology, as pointed out by Sir Richard Burton and others, was the idea that ability is not innate, but the result of culture of any particular type, instead of the other way around. "Much learning" said Heraclitus, "does not develop mind,"<sup>15</sup> nor did the Revival of Learning revive the emancipating individualizing spirit of Greek scientific thought, but only a way of appreciating it. No power on earth could have stopped a mediæval scientist from discovering Ohm's law or the binomial theorem or the bacterial causation of communicable diseases, if he had had the properly constituted mentality for such a feat. Indeed, Thomas Aquinas, the most mediæval of all mediæval thinkers, regarded intellectual contemplation, the honest reactions of a sensitized photographic plate, as a beatitude; and so intense was mediæval conviction that suffering humanity has been penalized by the brainless blundering of its leaders that Dante begins by defining the hell of his visions as the specific limbo of the decerebrate—

"Le genti dolorose,  
C'hanno perduto 'l ben dell' intelletto"

Goethe's view (that of the Provost of Eton) is broader and more humorous:

"Verständige Leute kannst du irren sehn,  
In Sachen, nämlich, die sie nicht verstehen."

Even more tolerant is this little sentence of Trousseau:

"Les empiriques, chose triste à dire, ont toujours beaucoup d'accès auprès des gens d'esprit"

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<sup>15</sup>An amusing example is that of the individual in the Spoon-River Anthology who studied the calculus to build a steam-engine:

"And all Spoon River watched and waited  
To see it work, but it never worked.  
And a few kind souls believed my genius  
Was somehow hampered by the store.  
It wasn't true. The truth was this:  
I didn't have the brains."

The truth is that once the well-springs of Greek science were dried up, mediæval science had little to go on until a few spirits, bolder than the rest, introduced the idea of experimentation. Other things being equal, such inventions and discoveries as printing, firearms, the mariner's compass, spectacles or the use of mercurials were taken up as rapidly in the later Middle Ages as were electric motors, telephoning, radio, aviation, vaccination, auscultation, anaesthesia, antiseptis or the Röntgen rays in our own period. But Galileo's thermometer and the pulse-timing of Galileo, Kepler, Cusanus and Sanctorius had to wait until physicians knew what pulse and temperature really signify. The Herbals and Bestiaries illustrate the anonymous, collectivistic spirit of the mediæval peoples, the preference of the masses of humanity for cults and fashions that do their thinking for them in certain directions, and of that tendency we have a surfeit in the movie mentality, jazz rhythms in place of music and radio announcements of the present hour.

F. H. GARRISON.

# ANNUAL GRADUATE FORTNIGHT

## Disorders of the Circulation

October 19 to 30, 1931

### SOME CLINICAL FEATURES OF CORONARY ARTERY DISEASE\*

(ABSTRACT) \*\*

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In the latter part of the eighteenth century, Edward Jenner first suggested the probable relationship between calcareous deposits in the coronary arteries and that "disorder of the breast" to which his contemporary, Heberden, gave the name "Angina Pectoris." Leyden, in 1884, gave an excellent description of coronary sclerosis and thrombosis, and for the first time satisfactorily correlated the clinical aspects and pathologic changes. During the past twenty years, there has been renewed interest in acute coronary obstruction. In the development of our knowledge concerning this condition, the paper of Obrastzow and Straschesko, in 1910, and the publications of J. B. Herrick, in 1912 and 1919, will stand, together with Leyden's account, as historic landmarks.

Arteriosclerosis of the coronary arteries, with the concomitant morbid changes in the heart, is numerically by far the most important of the affections which involve these vessels. Syphilis is seen almost exclusively in association with specific aortitis, and assumes clinical importance when the orifice of one or both coronaries becomes narrowed or obliterated. Embolism is rare. In a series of 3093 autopsies performed at the Presbyterian Hospital in the course of twenty-four years, this condition was met with but three times. The coronary lesions of rheumatic fever, for the present, are of interest chiefly to the pathologist.

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Each year, more people are dying from diseases of the heart. The rising mortality curve is due almost entirely to a greater number of deaths in persons over forty-five years of age. The increasing number of cardiac deaths recorded in older individuals may be explained in part by the fact that more are living to the "heart age"; in addition, the growing body of knowledge concerning cardiovascular conditions has resulted in more accurate diagnosis.

In order to determine whether affections of the coronary arteries are also showing a rising trend in their incidence, an analysis was made of the autopsy and clinical records of the Presbyterian Hospital during the ten year period, 1920 to 1929, inclusive. In the autopsy series, there was no distinct trend either up or downward. The evidence presented by this particular group of cases affords no support for the current impression that an increasing proportion of the population is dying of coronary artery disease. In the clinical series, during the same period, there was a fourfold increase. This discrepancy between post-mortem and bedside records may well be explained by the fact that in recent years many of the milder, non-fatal and less typical forms of coronary disease are being recognized with increasing frequency.

Clinically, the cases of coronary sclerosis (exclusive of thrombosis) may be divided according to their presenting symptoms into four groups: (1) those with cardiac insufficiency; (2) those with cardiac pain; (3) those with digestive disturbances; (4) those without symptoms, and sometimes without signs—the latent type. Obviously, there are many mixed cases with symptoms from more than one group.

Thrombosis of a coronary artery may be considered as an episode in the natural history of coronary sclerosis, for a thrombus almost invariably forms in a vessel already the seat of atheroma or calcification. There are mild and atypical cases, many of which are undoubtedly overlooked. That such cases truly represent a thrombotic closure is often borne out by serial electrocardiographic studies,

in which successive changes appear in the records; or by the occurrence, months or years later, of a more severe and perhaps fatal attack.

Following thrombosis of a coronary artery, the immediate mortality in the first attack, according to a recent study, is sixteen per cent. In patients having two or more attacks, the time interval between the first and second attack is less than one year in about half the cases. One patient remained in good health for seventeen years, to die at the end of this period following closure of another coronary branch. Mild initial symptoms and a rapid rate of recovery tend to indicate a favorable immediate outcome. But in any given instance, it is extremely difficult to prognosticate as to the liability to recurrence, or to estimate the probable expectancy of life.

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# ELECTROCARDIOGRAPHIC FEATURES OF CORONARY DISEASE\*

(ABSTRACT) \*\*

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To determine the frequency of the electrocardiographic features which may appear, 280 records obtained from 100 ambulatory patients with the diagnosis of coronary arteriosclerosis were studied. The diagnosis was very carefully considered, and all doubtful cases were excluded. Likewise, in reporting the electrocardiographic features, great care was used to report only quite definite variations from the normal form of the waves.

Inversion of T occurred in 26 cases; the "coronary T wave" in 21; inverted T in leads 1 and 2 together, in 18 cases; abnormal duration of QRS in 16; significant notching or slurring of QRS in 16; abnormally large Q3 in 13; diphasic T in leads 1 or 2 or both, in 12; inverted T in leads 2 and 3, in 10.

Thirty cases had normal ventricular waves, but of the fifteen who had had previous or subsequent records made, 2/3 showed abnormal ventricular waves in one or more of these other records. Certain patients may give two or more records with normal waves and yet the differences between these records may be so great that an abnormal myocardium could be diagnosed.

Dividing the cases into two groups, depending upon whether or not the history included an attack of coronary thrombosis, disclosed that the coronary T wave and the large Q3 were much more frequent in the cases with antecedent thrombosis while auricular fibrillation, the wide

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\*\*To be published in full. Information may be obtained from author.

notched QRS group and diphasic T waves were more frequent in the cases without thrombosis.

In order to observe the changes which occur when coronary arteriosclerosis leads to thrombosis with cardiac infarction, 197 records obtained from 25 patients with this condition were studied. The typical elevation or depression of the R-T segment was found in 20 of these cases; the coronary T wave in 18; low voltage of QRS in 13; a large Q3 in 12; the T wave was inverted in leads 2 and 3 in 14 cases; in lead 1 alone in 10, and in leads 1 and 2 together in 8. Only one case showed normal ventricular waves. These were in a record taken the second day of the attack, but all subsequent records of this patient showed abnormal features.

If the typical change of the R-T segment occurred, it was found in the record taken the day of the attack in each of the 10 cases that had one taken on this day. It may be present for only one day, or for as long as 20 days. It usually disappears between 5 and 11 days after the attack, usually giving place to the coronary T wave.

The coronary T wave, found in 18 cases of this series and in 21 of the ambulatory group, tends to change in time to a more normal form, though it may persist unchanged in some cases for years. In a few cases it changes to an inverted T without the characteristic upward convexity, but in many cases it gives place to a normal upright T wave. This may indicate a healing of the lesion in the myocardium, though such healing may conceivably be accompanied by a fibrous scar.

Changes in QRS are less frequent than changes in T, but left axis deviation is very common in cases who have had attacks. The large Q3 is common in patients who have had attacks, especially if the attacks have been recent.

Inversion of T in lead 1 alone, leads 2 and 3, or leads 1 and 2, or all three leads was a common occurrence in the group of patients with recent infarction, also in the



ambulatory patients with a history of infarction, much less so in the ambulatory patients without infarction.

Normal waves occurred in the records of 30 of the 100 ambulatory cases and in only one of the records of the cases with recent infarction as has been described.

In view of these findings and in the light of our knowledge of the pathological changes associated with coronary arteriosclerosis, it seems that the electrocardiogram is abnormal because of an abnormal physiological state of the myocardium. In the great majority of cases this is associated with a pathological change in the myocardium, perhaps an acute or chronic inflammatory reaction, perhaps an acute degeneration due to a toxin as in diphtheria, or to any infarction as after coronary thrombosis, or perhaps a chronic degeneration due to the more prolonged duration of a deficient circulation as occurs when the arteries are narrowed but not thrombosed. Certain cases may die so soon after coronary thrombosis that degenerative changes do not have time to occur. Certain cases with chronic narrowing of the coronary branches may not develop changes for a considerable time.

The finding of a record with normal ventricular waves can almost always be taken to indicate a normal myocardium. The heart may be enlarged, the valves diseased, or the coronaries affected by atheroma, but if the ventricular waves are normal, the myocardium will not be the seat of inflammation or degeneration except in rare instances. There is a small area on the anterior and another on the posterior surface of the heart where a lesion might occur and because of its position in the heart, would not affect the electrocardiogram taken by the standard leads. There are a few patients who have suffered a coronary thrombosis with healing and who have normal ventricular waves. Some of these are really abnormal for the individual, could we only have the record previous to the attack for comparison. Some may have returned to normal after passing through the changes associated with an attack, and because

of healing of a small infarct with formation of a small scar, there is no trace in the record. There are a few cases with cardiac insufficiency and normal waves which are very difficult to explain with our present knowledge. Autopsy reports on these cases are so far lacking.

Prognostic importance can be attached to the finding of an abnormal electrocardiogram, but it must not be made the sole basis for the prognosis. It gives information about the presence of structural myocardial change and some information about the degree of this change, but this phase of the patient's condition is only one part of the prognosis. In addition to the myocardial damage, there must be considered the degree of interference with myocardial function, the possibility of structural repair, the possibility of a restoration of function and the presence or absence of complicating conditions, such as hypertension, a life of physical activity, and so on. Furthermore, it must always be borne in mind that a prognosis deals with an average patient and that we are talking to a particular patient who may not do as well as the average or who may do much better.

# THE TREATMENT OF CORONARY ARTERY DISEASE INCLUDING THROMBOSIS\*

(ABSTRACT) \*\*

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*Introduction:* Physicians are regarding with concern the apparent increase in angina pectoris and coronary artery disease, especially as these conditions have incapacitated many of our ablest men and women at the period of their greatest productivity. It is possible that the increase in coronary disease is accounted for by the increased span of life. However, there has also been noted an increase in duodenal ulcer and the psycho-neuroses, and it is possible that the increase in these as well as in angina pectoris is due to another factor, that is the stress and strain of modern life especially in urban communities. The apparent increased clinical incidence of angina pectoris and coronary artery disease has been ascribed to still other factors, such as the more widespread use of tobacco, to errors in diet, to an increased tendency to thrombosis, etc. By the term "angina pectoris" is meant not a clinical entity, but an assemblage of symptoms already enumerated by Dr. Levy, due to a variety of causes, but usually associated with coronary artery disease.

*Prophylaxis:* Much more may be accomplished at the present time by preventing the onset of this group of disorders than in curing them after the inception of clinical symptoms. The prevention of coronary artery disease is almost identical with the question of the prevention of arterial disease in general. Angina pectoris and coronary artery disease are also found in association with such conditions as arterial hypertension, diabetes, gout, rheumatic

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valvular disease, polycythemia vera, myxedema, periarteritis nodosa, etc. So the prophylaxis of angina pectoris depends in part on our ability to prevent the onset, progress and complications of these conditions. In some cases of essential hypertension with obesity much may be accomplished by a systematic but safe reduction cure; one often sees a drop in blood pressure paralleling the weight loss. In the management of the diabetic patient it must be the purpose of the treatment not only to avoid such complications as acidosis and coma, but also to control the hyperglycemia and the hypoglycemia, for even the hypoglycemia, usually due to insulin administration, may precipitate an attack of angina pectoris. No practitioner can afford to ignore the rôle which tobacco-smoking appears to play in certain arterial conditions, such as thromboangiitis obliterans. As tobacco undoubtedly plays a rôle in certain cases of angina pectoris, it is really better for all such patients to abstain from smoking at least for a trial period.

There is an *hereditary tendency* and a certain physical *constitution* which predisposes to coronary artery disease. The heredo-familial factor is especially marked among the younger victims of coronary thrombosis. Individuals with a heredo-familial and a personal constitutional predisposition should be earnestly warned to be moderate in all their activities and to watch for such early signs of coronary disease as breathlessness on relatively mild exertion and precordial uneasiness or oppression. If prophylactic measures can postpone the onset of the mischief for a few years, there is reason to believe that the prognosis is improved, for Gross has shown that with advancing years the collateral circulation especially of the left heart becomes more developed, so that closure later in life brings less dire consequences.

It is best to consider first the treatment of angina pectoris, without demonstrable coronary artery occlusion and then the treatment (1) of the acute phase of coronary occlusion, (2) of the interval, (3) of the chronic phase. Of

the chronic phase there are in general two groups of cases:

(a) Those with repeated attacks of angina pectoris.

(b) Those that suffer from chronic myocardial insufficiency frequently due to multiple myocardial infarcts.

*The treatment of angina pectoris without demonstrable coronary occlusion:* The immediate treatment of such an attack consists of (1) rest, (2) reassurance, (3) one of the vasodilators such as nitroglycerine or amyl nitrite, (4) alcohol, (5) a sedative or opiate. To prevent the recurrence of such attacks the patient's occupation and habits of life should be made less strenuous, and he should be put into the best possible physical and psychic condition. He should avoid smoking, overeating, exposure to cold, overexertion, fear, anger, worry and excitement. Equanimity should be his watchword. The indications for the treatment of any metabolic disturbance, such as diabetes and gout, and for endocrine disturbances, such as hyperthyroidism and myxedema, should be met. The drug treatment during the interval consists of the administration of

- (1) One of the xanthine group such as theophylline-ethylene-diamine, theobromine, or theobromine sodium salicylate.
- (2) One of the vasodilators.
- (3) Such sedatives as codein, phenobarbital, or the bromides.
- (4) Small doses of iodides.
- (5) Papaverin either alone or in combination.

*The treatment of acute coronary artery occlusion, usually thrombosis with cardiac infarction:* Morphine is a god-send in such an attack and should be administered in  $\frac{1}{4}$  grain doses, and enough given to obtain relief without endangering the patient's life. As soon as the pain has abated, the morphine is replaced by milder sedatives. After the pain is relieved, and if the patient's condition is poor, it is our custom to give large doses of caffeine by day, and to save the sedatives for the night. As soon as

the patient is out of immediate danger, the caffeine is replaced by another of the xanthine group. This treatment with strict rest in bed is continued for at least six weeks to avoid the danger of embolism from an intracardiac thrombus and to allow time for the myomalacia to be replaced by connective tissue. After six weeks the physician must use his finest judgment in directing a gradual return to modified activity. The acute stage of occlusion is sometimes marked by attacks of syncope, of pulmonary edema, or of paroxysmal dyspnea, and each of these complications must receive appropriate emergency treatment.

The arrhythmias which may require treatment are auricular fibrillation, auricular flutter, various grades of heart block and paroxysmal tachycardia. Ventricular tachycardia is the most dangerous, and quinidine has proved effective in abolishing this complication, but large doses as recommended by Levine must be administered.

*Oxygen* administered in a good oxygen tent or preferably in a chamber is apparently of value in the severe cases. The favorable results we have seen have been in those cases which have had pulmonary complications.

During the weeks or months following the acute onset restrictions must not be too readily lifted. During this period the milder sedatives may be used and the fluids restricted to about 1000 c.c. per day. If there is any tendency to nocturnal cardiac dyspnea, or pulmonary edema, the daily fluid intake should be completed by the late afternoon, and an occasional dose of salyrgan (mersalyl) administered.

For purposes of treatment, the cases which pass into the more *chronic* phase may be divided into two groups:

- (1) Cases of paroxysmal cardiac pain, with or without coronary artery occlusion. (It is at times impossible to determine with certainty whether there has or has not been an actual occlusion).

- (2) The important group of chronic myocardial insuf-

iciency, frequently due to multiple myocardial infarcts. (These are the cases so commonly but improperly called "chronic myocarditis").

A variety of methods of treatment have been tried for recurrent attacks of angina, one or other of which may in the future prove to be very valuable. At present they can only be mentioned briefly, as no one of them is uniformly successful.

1. *Tissue extracts*: There have been favorable results reported with the use of each of the following tissue or organ extracts—myoston, myol, myotrat, hormocardiol, lacarnol, carnigan, eutonon, angioxyl, telatutin, padutin or kallikrein.

It is possible that an adenosin-like substance is the potent factor in all these extracts, except in kallikrein which is said to be a complex carbohydrate. Pharmacologically adenosin is a marked dilator of the coronary arteries in all animals so far tested, and therefore theoretically would seem to be indicated under conditions in which the coronary flow can be materially increased. In the one case in which we tried it carefully, it had no demonstrable effect on the pain, but produced a marked sinus block. Some of the other extracts are now being tried in America, as they have been abroad, and one must await the results of these investigations.

2. *Inhalations of carbon dioxide* in the treatment of the early stages of angina pectoris have been used with beneficial results on a very few cases by Yandell Henderson. There will doubtless be further reports on the experimental and clinical results with this method.

3. *Diathermy* appears to be the only physiotherapeutic measure, among the many that are employed in heart disease, which may have a direct influence on the heart. The best results are obtained with those patients in whom the symptoms of angina pectoris appear on exertion and consist only of retrosternal pain or oppression. The value of

diathermy for symptomatic relief cannot be more definitely established until the results with this method are compared with a control series.

4. The treatment of anginal pain by *paravertebral short wave radiation* was first attempted by Groedel in 1923; it has been continued by a group of French observers, and recently by an American. The results so far certainly warrant a continuation of the observations on a larger series of cases followed up for a longer period of time.

5. *Surgical methods*: The fundamental principle for all surgical measures for angina pectoris, whether associated with coronary artery disease or not, has been to interrupt the nervous pathways, usually the afferent sympathetic nerves or ganglia, which conduct the impulses between the heart and central nervous system. It is clear, therefore, that the various surgical procedures which have been tried can be only palliative and give only symptomatic relief, but do not materially change the basic pathologic condition. It is impossible to detail the eight or more surgical procedures on the sympathetic nervous system which have been suggested, or to give the results immediate and ultimate in respect to their effect upon the pain. The recent review by Yater and Trehwella well summarizes the case for and against these operative procedures for angina pectoris as follows:

"The case for this type of treatment is

1. Complete relief of the original pain in 40.5 per cent of cases and partial relief in 27 per cent.
2. Low immediate operative mortality when cases associated with syphilitic aortitis are eliminated.

The case against the operative treatment of angina pectoris is

1. No relief or only partial relief in 53 per cent of cases.
2. Post-operative appearance of annoying paresthesias, Horner's syndrome, new pains or other evil complications in 31 per cent of cases.
3. Effectiveness of amyl nitrite or nitroglycerine for individual attacks of pain is certainly much more than 40.5 per cent of cases.
4. Apparent absence of influence upon the course of the disease."



It must always be remembered that any operative procedure, even a minor one, on a case of coronary disease may result in a fatal issue. For this reason we have discontinued the sympathectomies and now resort to paravertebral alcohol block.

*Paravertebral nerve block* for angina pectoris was tried out rather extensively by Brunn and Mandl of Vienna with the use of novocaine alone. In 1925 Swetlow introduced a definite improvement on this method by following the novocaine injection by one of 85 per cent alcohol, with the idea of thus producing a Wallerian degeneration and consequently a more prolonged block of the nervous impulses. He identified the nerve roots which should be injected by carefully mapping out the skin areas of hyperesthesia, hyperalgesia and hyperthermesthesia on the surface of the body. After selecting the nerve roots by this procedure he injected first 1 per cent procaine followed by 3 to 5 c.c. of 85 per cent alcohol into the region of the rami communicantes and dorsal roots, as these are the lateral pathways for afferent sensory impulses to reach the spinal cord. It has become evident that paravertebral alcohol block is preferable to sympathectomy both from the standpoint of benefits observed and from a consideration of the dangers involved. Levy and Moore have recently summarized the literature of paravertebral alcohol block, comprising 40 complete cases and adding 9 of their own. They record complete or almost complete relief in 51 per cent of the cases, with some improvement in 34 per cent, and failure in 15 per cent.

*Treatment of the chronic phase of coronary artery closure, with myocardial insufficiency:* The chief symptoms are dyspnea, paroxysmal nocturnal dyspnea, progressive weakness, retention of water, often loss of weight in spite of this dropsy, enlargement of the liver, and usually not much in the way of anginal pain. The chief complication is the water retention, but with the judicious and adequate use of diuretics, it has been possible to enable many of these patients to maintain their water balance.

When the usual routine measures, i. e. (1) rest in bed, (2) restriction of salt and fluid, and (3) digitalis, have not produced any reduction in the edema, the next step is the choice of one of the following diuretics or a combination of two or more of these:

- (1) The purine group.
  - (a) Caffein
  - (b) Theobromine
  - (c) Diuretin
  - (d) Theophylline
  - (e) Theophylline-ethylene-diamine
- (2) Salts altering the acid-base balance
  - (a) Ammonium chloride
  - (b) Ammonium nitrate
  - (c) Calcium chloride
  - (d) Calcium nitrate
- (3) Urea
- (4) The mercurial compounds
  - (a) Novasurol or Merbaphen
  - (b) Salyrgan or Mersalyl
  - (c) Novurit
  - (d) Neptal

Under continued therapy it has been possible not only to prolong the life of many of these chronic coronary artery cases, but to restore them to a moderately active life.

*Summary:* In the foregoing discussion on the treatment of coronary artery disease more emphasis has been placed on the *extra-cardiac* factors which may influence the heart, than upon methods of treating the heart directly. Great stress has been laid upon the possible *prevention* of coronary artery disease and associated conditions, especially in instances in which heredo-familial or constitutional factors may predispose to this disorder. After the actual inception of symptoms the importance of relieving the heart of unnecessary effort, both physical and psychic, has been pointed out. A brief review of the various methods of treatment including surgical procedures and paravertebral alcohol block for such cases as have resisted medical

measures, has been given. The chronic type of coronary artery disease and occlusion has been described and it has been noted that the prognosis is not nearly so bad as is commonly believed. The use of modern diuretics has been most helpful in prolonging the lives of those patients who have suffered predominantly from water retention. If these chronic patients live within their capacity and below the threshold of pain, they can frequently continue at their occupation, especially if this is sedentary, and enjoy years of productive work.

## JEAN-DOMINIQUE LARREY AND THE "ACADÉMIE DE NEW YORK"

Le Baron, Jean-Dominique Larrey, "chirurgien en chef de la grande armée," and devoted follower of Napoleon, died in 1842, five years before the New York Academy of Medicine was founded. It is surprising to find that in 1837 he wrote to a distinguished member of the New York medical profession a letter concerned largely with the "Académie de médecine de New York."

As the history of the medical societies organized here in the early years of the nineteenth century is vague and indefinite, it is difficult to decide to what organization he was referring. The mortality rate of those infant societies was high. Of most of them little is known, but the carefully transcribed minutes of the meetings of a few of the more lasting ones survive today. The letter from Larrey is addressed to Felix Pascalis-Ouvière, "Directeur de la faculté de médecine de New York." Pascalis was a Frenchman by birth and a graduate of Montpellier. After receiving his degree he migrated to San Domingo and practiced medicine there with great success, but was forced to leave during the uprisings of 1793. He took refuge in this country and became prominent in his profession in Philadelphia and New York. He carried on a wide correspondence with scientists all over the world. There is no record of his having been "directeur" of any medical faculty here. He was, however, a Fellow and a Trustee of the College of Physicians and Surgeons (founded in 1807), and it is probable that this is the "faculté" which Larrey wrote about.

The great surgeon wrote to Pascalis from "Paris le 5 mai, 1837—jour de douloureuse mémoire," on the sixteenth anniversary of the death of his great leader and protector. Pascalis had written Larrey in behalf of the "Académie" to acquaint him with the fact that the organiza-

tion was bestowing a diploma upon him and was sending him a package of books. Larrey awaited them in vain. His reply complains of never having received them, and tells Pascalis that he is taking the opportunity of sending him by one of his "célèbres confrères," Dr. Valentine Mott, a package to be presented to the "académie de New York." The package contained volumes IV and V of his *Clinique chirurgicale*, which had recently appeared, and a number of articles by himself and his son. He requested, almost demanded, that a report be made of the volumes and sent to him. Another present he was making to the "Académie," was meant for the anatomical museum. It was the thorax of a man, operated upon by Larrey for empyema, the result of a blow of a sabre. The man was called Canon. In Larrey's *Clinique chirurgicale*, Vol. II, Paris, 1829, page 259, can be found a description of the case. If the thorax of M. Canon arrived safely in this country, it has probably long since disappeared. The many moves of the College of Physicians and Surgeons and the complete dissolution of its old anatomical museum make it almost a certainty that the thorax cannot be traced, and M. Jean-Baptiste Bernadotte, *dit* Canon, is now represented to posterity only by a few paragraphs in a musty old book.

There is no doubt of the greatness of Larrey's character. His splendid courage, an example to all who came in contact with him, made him beloved by all in the ranks of Napoleon's armies and admired and respected by his enemies on the field of battle. Napoleon is said to have called him the most honest man he had ever known. After the death of the emperor Larrey spent many years at the *Hôtel des Invalides*, teaching the younger doctors and working among many of the men who had been by his side in the campaigns. At the time he wrote to Pascalis an incident had occurred which caused the old surgeon to relinquish his post at the *Hôtel*. No one seems to know just what happened. The last lines in his letter display the resignation and dignity with which he met this disappointment. He says: "I regret for the *invalides*, for the young military surgeons and the interests of science that they have sent me

away from this *Hôtel* where I would have been able to continue my lessons in clinical surgery and my researches, but such is generally the lot of men who devote themselves with too much zeal and ardor to the welfare of humanity." His work did not stop there. The vigorous old soldier could not retire from the front. In 1842 he went with his son on the dangerous mission of inspecting the military hospitals in Algiers. His task completed there, he hastened back to Paris to make his reports, but death overtook him in Lyons. He died as he had always lived, devoting himself to the cause of humanity.

GERTRUDE L. ANNAN.

## RECENT ACCESSIONS TO THE LIBRARY

- Alexander, H. and Baer, G. *Praktisches Lehrbuch der Tuberkulose*.  
Leipzig, Barth, 1931, 371 p.
- Anderson, J. R. *Detachment of the retina*.  
Cambridge [Eng.], Univ. Press, 1931, 207 p.
- Ashton-Wolfe, H. *Further tales of immortal crimes*.  
London, Hurst, [1931], 285 p.
- Audouin, J. *La péricolite droite avec stase*.  
Paris, Doin, 1931, 115 p.
- Bailey, H. *Emergency surgery*.  
N. Y., Wood, 1930-1931, 2 v.
- Bennett, T. I. *The practical treatment of diabetes*.  
London, Constable, 1931, 107 p.
- Berry, R. J. A. and Gordon, R. G. *The mental defective; a problem in social inefficiency*.  
London, Paul, 1931, 196 p.
- Bonar, J. *Theories of population from Raleigh to Arthur Young*.  
London, Allen, [1931], 253 p.
- Bray, G. W. *Recent advances in allergy (asthma, hay-fever, eczema, migraine, etc.)*.  
Phil., Blakiston, 1931, 432 p.
- Brill, M. M. *Here's health*.  
N. Y., MacVeagh, 1931, 120 p.
- Burdon-Cooper, J. and Roberts, A. *Studies in the photo-activity and therapy of the tungsten-titanium arc*.  
Bristol, Wright, 1931, 85 p.
- Campbell, M. F. *Infections of the kidney*.  
N. Y., Harper, 1931, 343 p.
- Cheval, M. and Dustin, A. P. *Théorie et pratique de la télécuriethérapie*.  
Paris, Masson, 1931, 234 p.
- Delafield, F. and Prudden, T. M. *A text-book of pathology*. 15. ed.  
N. Y., Wood, 1931, 1339 p.
- Derscheid, G. and Toussaint, P. *étude des méthodes plastiques dans le traitement de la tuberculose pulmonaire*.  
Bruxelles, Lamertin, 1930, 126 p.
- Dingwall, E. J. *Artificial cranial deformation; a contribution to the study of ethnic mutilations*.  
London, Bale, 1931, 313 p.
- Dock, L. L. and Stewart, I. M. *A short history of nursing*. 3. ed.  
N. Y., Putnam, 1931, 404 p.
- Duvernay, L. *L'arthrite chronique de la hanche*.  
Paris, Masson, 1930, 145 p.
- Effler, L. R. *Analogy and medicine; a series of brief essays on popular medicine*.

- [Balt., Waverly], 1931, 259 p.
- Erskine, A. W. Practical x-ray treatment.  
St. Paul, Bruce, 1931, 116 p.
- Farez, P. Comment échapper à la maladie?  
Paris, L'Expansion Scientifique Française, 1931, 350 p.
- Fischer, I. Die Eigennamen in der Krankheitsterminologie.  
Wien, Perles, 1931, 143 p.
- Foltz, J. M. Surgeon of the seas; the adventurous life of Surgeon General  
Jonathan M. Foltz.  
Indianapolis, Bobbs-Merrill, [1931], 351 p.
- Frazer, J. E. S. A manual of embryology.  
London, Baillière, 1931, 486 p.
- Genty, V. Un grand biologiste, Charles Robin.  
Lyon, Rey, 1931, 141 p.
- Graves, W. P. Female sex hormonology; a review.  
Phil., Saunders, 1931, 131 p.
- Hagedorn, H. Leonard Wood, a biography.  
N. Y., Harper, 1931, 2 v.
- Holmyard, E. J. Makers of chemistry.  
Oxford, Clarendon, 1931, 314 p.
- Huber, E. Evolution of facial musculature and facial expression.  
Balt., Johns Hopkins Press, 1931, 184 p.
- Ivens-Knowles, (Mrs.) M. H. F. Caesarean section.  
London, Churchill, 1931, 82 p.
- Ivy, R. H. and Curtis, L. Fractures of the jaws.  
Phil., Lea, 1931, 180 p.
- Jaeger, E. C. A dictionary of Greek and Latin combining forms used in  
zoölogical names. [2. ed.]  
London, Baillière, [1931], 157 p.
- Keith, (Sir) A. The place of prejudice in modern civilization.  
London, Williams, 1931, 54 p.
- Kirschner, M. Operative surgery; general and special considerations.  
Phil., Lippincott, [1931], 666 p.
- Kretschmer, E. The psychology of men of genius.  
London, Paul, 1931, 256 p.
- Kudo, R. R. Handbook of protozoölogy.  
London, Baillière, [1931], 451 p.
- Lévy-Bruhl, L. Le surnaturel et la nature dans la mentalité primitive.  
Paris, Alcan, 1931, 526 p.
- Lhermitte, J. Le sommeil.  
Paris, Colin, 1931, 211 p.
- Martial, R. Peau et syphilis.  
Paris, Michel, [1930], 218 p.
- McFeely, J. D. Recollections of an old and observant practitioner.  
London, Beck, [1931], 246 p.
- Meyer-Burgdorff, H. Untersuchungen über das Wirbelgleiten.  
Leipzig, Thieme, 1931, 136 p.



- Olpp, G. Hervorragende Tropenärzte in Wort und Bild.  
München, Gmelin, 1932 [1931], 446 p.
- Prinzing, F. Handbuch der medizinischen Statistik. 2. Aufl.  
Jena, Fischer, 1930-31, 2 v. in 1.
- Quarelli, G. Clinica delle malattie professionali.  
Torino, Unione Tipograficoeditrice Torinese, 1931, 321 p.
- Richet, C. R. and Richet, C. Physiologie de l'homme.  
Paris, Rieder, [1931], 96 p.
- Rosenfeld, S. S. Gynecology and urology for nurses.  
N. Y., Wood, 1931, 230 p.
- Sainsbury, H. The cardiac cycle.  
Bristol, Wright, 1931, 79 p.
- Sanger, (Mrs.) M. (Higgins). My fight for birth control.  
N. Y., Farrar, [1931], 360 p.
- Saubeval, H. Médecins et clients.  
[Paris], Flammarion, [1931], 246 p.
- Science (The) and practice of dental surgery. 2. ed.  
London, Milford, 1931, 2 v.
- Serono, C. Memorie e comunicazioni scientifiche (1894-1930).  
Roma, Istituto Naz. Med. Farm. Serono, [1931], 701 p.
- Spiegel, E. A. and Sommer, I. Ophthalmo- und Oto-Neurologie.  
Wien, Springer, 1931, 366 p.
- Stein, C. Die medikamentöse und allgemeine Behandlung der Ohrenkrankheiten.  
Wien, Springer, 1931, 103 p.
- Thugüt, F. Syphilis; ihr biologischer Ursprung und der Weg zu ihrer Ausrottung.  
Stuttgart, Enke, 1931, 109 p.
- Todd, (Mrs.) C. (Leupp). Easier motherhood.  
N. Y., Day, [1931], 199 p.
- Webster, F. A. M. and Heys, J. A. Keeping fit at forty; simple exercises for men of middle age.  
London, Warne, [1931], 119 p.
- White House Conference on Child Health and Protection. Section III. Education and Training. Committee on the Family and Parent Education. The home and the child. . . . Report of the Subcommittee on Housing and Home Management.  
N. Y., Century, [1931], 165 p.
- White House Conference on Child Health and Protection. Section III. Education and Training. Committee on the Infant and Preschool Child. Nursery education. . . . Report.  
N. Y., Century, [1931], 187 p.
- Wood, C. A. An introduction to the literature of vertebrate zoölogy.  
London, Milford, 1931, 643 p.

# PROCEEDINGS OF ACADEMY MEETINGS

## STATED MEETINGS

Thursday Evening, November 5

### ORDER

- I. EXECUTIVE SESSION at 8:30 o'clock
  - a. Presentation of portraits of Hermann Michael Biggs and Samuel W. Lambert,—George David Stewart, John A. Hartwell
  - b. Report of the Nominating Committee  
Nominations: one Vice-President to fill unexpired term of Dr. John O. Polak, deceased; and one Vice-President for three years; two Trustees for five years; one member of the Library Committee; four members of the Committee on Admission for three years; and Treasurer for three years.
  - c. Election of Fellows
- II. THE ANNIVERSARY DISCOURSE at 8:45 o'clock  
"The university and the medical profession," James Ewing, Professor of Pathology, Cornell University Medical College  
A collation (Loomis Entertainment Fund) was served after adjournment, to which the Fellows and guests are invited.

### THE HARVEY SOCIETY

In affiliation with

### THE NEW YORK ACADEMY OF MEDICINE

Thursday Evening, November 19, at 8:30 o'clock

### THE SECOND HARVEY LECTURE

"The Messages in Sensory Nerve Fibres"

E. D. ADRIAN

Cambridge, England

This lecture takes the place of the second Stated Meeting of the Academy for November.

JAMES W. JOBBING, President, Harvey Society

DAYTON J. EDWARDS, Secretary, Harvey Society

## SECTION MEETINGS

### SECTION OF DERMATOLOGY AND SYPHILOLOGY

Wednesday Evening, November 4, at 8:30 o'clock

(Please note change of date)

### ORDER

- I. READING OF THE MINUTES
- II. PRESENTATION OF CASES
  - a. Cases from the Stuyvesant Square Hospital
  - b. Cases from the Good Samaritan Dispensary
  - c. Miscellaneous cases.

III. GENERAL DISCUSSION

IV. EXECUTIVE SESSION

SECTION OF SURGERY .

Friday Evening, November 6, at 8:30 o'clock

ORDER

I. READING OF THE MINUTES

II. PRESENTATION OF CASES

- a. 1. A case of splenectomy for traumatic rupture with postoperative platelet crisis
2. A case of acute hemorrhagic osteomyelitis of the ilium resembling a giant cell tumor, Benjamin R. Shore
- b. 1. A case of congenital arterio-venous fusion of the arm.
2. A case of Raynaud's disease of the lower extremities. Bilateral femoral sympathectomy. Five year result, Francis M. Donehue

III. PAPER OF THE EVENING

The treatment of fractures into joints, Ralph Colp, Sigmund Mage

IV. GENERAL DISCUSSION

V. EXECUTIVE SESSION

JOINT MEETING

*of the*

SECTION OF NEUROLOGY AND PSYCHIATRY

*and the*

NEW YORK NEUROLOGICAL SOCIETY

Tuesday Evening, November 10, at 8:30 o'clock

ORDER

I. READING OF THE MINUTES

II. PRESENTATION OF CASES

- a. Self avulsion of both eyes and optic nerves by a postencephalitic patient, S. P. Goodhart
- b. Case presentation, Foster Kennedy

III. PAPERS OF THE EVENING

- a. The action of bulbocapnine in animals with various experimental lesions of the nervous system, Armando Ferraro, S. E. Barrera (by invitation)
- b. The relation of the neocerebellum to the motor cortex: An experimental analysis on cats and monkeys, John F. Fulton, Yale University (by invitation)

IV. DISCUSSION

S. H. Pike, Ph.D., Columbia University (by invitation), Oliver Strong, Smith Ely Jelliffe, Louis Aronson, Henry Alsop Riley, J. Ramsay Hunt, Joshua Rosett

V. EXECUTIVE SESSION

SECTION OF HISTORICAL AND CULTURAL MEDICINE

The November meeting of the Section of Historical and Cultural Medicine of The New York Academy of Medicine was held at the Rockefeller

Institute on Wednesday evening, November 11, at 8:30 o'clock. The meeting was under the joint auspices of the Section of Historical and Cultural Medicine, the Rockefeller Institute and the Charaka Club. The speaker of the evening was Professor Henry E. Sigerist, Professor at the University of Leipzig and Director of the Institute of Historical Medicine. The subject of the address was: "Greek Medicine and Modern Medicine; a Comparison."

SECTION OF PEDIATRICS

Thursday Evening, November 12, at 8:30 o'clock

ORDER

PAPERS OF THE EVENING

a. Case presentation

Congenital diaphragmatic hernia successfully operated on in a 13-day old infant, Abraham Tow

Discussion, Edward J. Donovan, Pol N. Coryllos

b. Studies on the mechanism of acute upper respiratory infection, Alphonse R. Dochez

Discussion, Oscar Schloss

c. Susceptibility problems in poliomyelitis, C. W. Jungeblut (by invitation), E. Engles (by invitation)

Discussion, Rustin McIntosh

SECTION OF OPHTHALMOLOGY

Monday Evening, November 16, at 8 o'clock

(Please note change of hour)

ORDER

I. READING OF THE MINUTES

II. THE NEW YORK EYE AND EAR INFIRMARY CLINICAL PROGRAM

1. a. Methods of making microscopical eye specimens

b. Osteological preparations of sphenoidal sinus relations to optic foramen

c. Temporal bone with cells around the groove for the 6th nerve, Mr. Edward B. Burchell (by invitation)

Discussion, Samuel J. Kopetzky

2. The first fifty years of The New York Eye and Ear Infirmary, Bernard Samuels

3. An improved ophthalmotrope, Wendell L. Hughes

4. Two cases of familial degeneration of the retina, David Wexler

5. An unusual corneal condition, Wm. B. Doherty

6. Recording slit lamp findings, Henry Minsky (by invitation)

7. A method of determining the size of retinal lesions, Robert K. Lambert

8. Extensive irido-dyalisis, operation, reattachment, Ben Witt Key

9. Total blindness in a case of fracture of the frontal bone; recovery, Francis W. Shine

10. Dacriocystorhinostomy. Presentation of two cases, Webb Weeks

III. EXECUTIVE SESSION

SECTION OF MEDICINE

Tuesday Evening, November 17, at 8:30 o'clock

ORDER

- I. READING OF THE MINUTES
- II. PAPERS OF THE EVENING
  - a. Vitamins in adult nutrition, Walter H. Eddy (by invitation)
  - b. Calcium need and calcium therapy, Alice R. Bernheim
  - c. Obesity, Henry J. Spencer
- III. DISCUSSION  
Alfred F. Hess, Roger H. Dennett, Eugene F. DuBois

SECTION OF GENITO-URINARY SURGERY

Wednesday Evening, November 18, at 8:30 o'clock

ORDER

- I. READING OF THE MINUTES
- II. PRESENTATION: patients and reports
  - a. Echinococcus cysts in retrovesical space; suprapubic and perineal operations
  - b. Horse-shoe kidney with four pelves and ureters; excision of half
  - c. Large solitary cyst of kidney; excision of cyst with suture of kidney, A. R. StevensA new dissection technique for suprapubic prostatectomy, Irving Wills, The Santa Barbara Clinic, California (by invitation)
- III. PAPERS OF THE EVENING  
From the Department of Urology, New York Post Graduate Medical School
  - a. Studies of the isolated prostatic and epididymal secretions, James I. Farrell (by invitation)
  - b. Metabolism and viability of spermatozoa, John A. Killian (by invitation), C. Travers Stepita
  - c. Pre-fibrosis at the vesical neck—its pathological status and clinical significance, Samuel E. Kramer (by invitation), Joseph A. Hyams
- IV. GENERAL DISCUSSION

SECTION OF ORTHOPEDIC SURGERY

Friday Evening, November 20, at 8:30 o'clock

ORDER

- I. READING OF THE MINUTES
- II. PAPERS OF THE EVENING
  - a. Cystic nodules of the terminal phalanges, I. William Nachlas, Baltimore (by invitation)
  - b. A reconstruction-arthroplasty operation for the hip, Samuel Kleinberg
  - c. The peripheral vascular system in the chronic arthritides, Edgar M. Bick (by invitation)
- III. GENERAL DISCUSSION

SECTION OF OBSTETRICS AND GYNECOLOGY

Tuesday Evening, November 24, at 8:30 o'clock

ORDER

- I. READING OF THE MINUTES
- II. PRESENTATION OF CASES  
Program presented by the Junior Staff of the Women's Hospital
  - a. Case of puerperal infection with delayed operation, Nelson B. Sackett
  - b. Placenta accreta succenturiata, Ralph L. Barrett (by invitation)  
Discussion, Robert T. Frank, Morris Leff
  - c. Bilateral laceration of female urethra; repair; restoring function.  
(Lantern slides), William T. Kennedy  
Discussion, Frederick C. Holden
  - d. Roentgen differentiation of types of intestinal vaginal fistula.  
(Lantern slides), Harriet McIntosh (by invitation)  
Discussion, Leon T. LeWald, Arthur Stein
  - e. Case of intestinal obstruction complicating pregnancy, G. Gordon Bemis (by invitation), paper read by William T. Kennedy  
Discussion, Frederick C. Holden
  - f. Complications in two parturient women
    1. Pregnancy in an interposed uterus
    2. Delivery through a spurious birth canal, Ralph A. Hurd  
Discussion, Harvey B. Matthews, Frederick C. Holden, Gerard L. Moench
  - g. Pregnancy in a myomectomized horn of a bicornual uterus following extirpation of the other side, Albert H. Aldridge  
Discussion, Gerard L. Moench
  - h. Torsion of pedicle of spleen in the pelvis simulating a twisted ovarian cyst, Edward A. Bullard  
Discussion, Harvey B. Matthews, Arthur Stein
- III. GENERAL DISCUSSION
- IV. EXECUTIVE SESSION

SECTION OF OTO-LARYNGOLOGY

Wednesday Evening, November 25, at 8:30 o'clock

ORDER

- I. READING OF THE MINUTES
- II. PRESENTATION OF CASES  
Arthur B. Duel
- III. PAPERS OF THE EVENING
  - a. A demonstration of the development of the Ballance—Duel method of the surgical treatment of facial palsy. The employment of nerve grafts in the fallopian canal
  - b. Moving pictures and lantern slides of operated animals and humans
  - c. Clinical cases, Arthur B. Duel  
Discussion, James Ramsay Hunt, Charles A. Elsberg

IV. GENERAL DISCUSSION

V. EXECUTIVE SESSION

Report of Nominating Committee.

At this meeting the Section was asked to decide on a regular meeting date, either the second Friday or fourth Wednesday of the month.

AFFILIATED SOCIETIES

NEW YORK PATHOLOGICAL SOCIETY

In Affiliation with

THE NEW YORK ACADEMY OF MEDICINE

Thursday Evening, November 12, at 8:30 o'clock

ORDER

I. PRESENTATION OF CASES

- a. A case of generalized necrotizing arteritis, Charles T. Olcott

II. PAPERS OF THE EVENING

- a. Factors influencing the erythrocytic sedimentation, Thomas H. Cherry, John A. Killian
- b. Precipitation tests for syphilis, Harry Samuel Eagle, Johns Hopkins University (by invitation)

THE NEW YORK ROENTGEN SOCIETY

In Affiliation with

THE NEW YORK ACADEMY OF MEDICINE

Monday Evening, November 16, at 8:30 o'clock

ORDER

I. Demonstration of interesting cases and Roentgenograms

II. 9:00 P. M.

Early recognition of tuberculosis of the kidney and ureter by pyelography, Charles A. Waters, Baltimore (by invitation)

III. GENERAL DISCUSSION

Opened by Oswald Swinney Lowsley

IV. EXECUTIVE SESSION

NEW YORK MEETING

of the

SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE

Under the auspices of

THE NEW YORK ACADEMY OF MEDICINE

Wednesday, November 18, 1931, at 8:15 P. M.

- I. Radiotherapy and experimental herpes encephalitis in rabbits, N. Kopeloff and M. Holden
- II. Further observations on the transformation of type-specific pneumococci by *in vitro* procedures, M. H. Dawson and A. Warbasse (introduced by A. R. Dochez)
- III. Excretion of xylose, E. H. Fishberg and L. Friedfeld
- IV. Blood pressure and intestinal motor response to splanchnic stimulation after nicotine, M. G. Mulinos

- V. Influence of liver extract and acute infection on the reticulocytes and bone marrow of pigeons, G. L. Muller
- VI. Reticulocyte response to glutamic acid in pernicious anemia, S. S. Lichtman (introduced by G. Baehr)
- VII. Effects of acetylcholine injections on blood fat and glucose, M. J. Bruhn and H. E. Himwich
- VIII. Local inhibition of the Schwartzman phenomenon, H. M. Klein (introduced by G. Schwartzman)
- IX. Effects of diet and fasting on plasma phosphatase, A. Bodansky and H. L. Jaffe



## FELLOWS ELECTED DECEMBER 3, 1931

Philip Daly Allen .....	116 East 58 Street
John Russell Carty.....	477 First Avenue
Max Danzis.....	31 Lincoln Park, Newark
Oswald La Rotonda.....	16 West 122 Street
John J. Masterson.....	401 76 Street, Brooklyn
E. Forrest Merrill.....	30 West 59 Street
Russell Wright Morse.....	36 East 61 Street
Edith E. Nicholls.....	400 East 29 Street
William H. Ross.....	Brentwood, Long Island
Frederick F. Russell.....	Rockefeller Foundation
Laird S. Van Dyck.....	331 East 17 Street
Robert Pulley Wallace.....	112 East 74 Street
Gerald Bertram Webb.....	402 Bums Building, Colorado Springs

### ASSOCIATE FELLOWSHIP

Harry Benjamin Shuman, D.M.D.....	128 Newbury Street, Boston
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## DEATHS OF FELLOWS OF THE ACADEMY

JOHN EDMUND MACKENTY, M.D., 111 East 61 Street, New York City; graduated in medicine from McGill College, Montreal, in 1892; elected a Fellow of the Academy April 7, 1904; died, December 11, 1931. Dr. Mackenty was a Fellow of the American College of Surgeons, a member of the County and State Medical Societies, a member of the American Laryngological, Rhinological and Otological Society, a member of the American Laryngological Society, and Senior Surgeon to Manhattan Eye, Ear and Throat Hospital.

NORTON LUTHER WILSON, M.D., 410 Westminster Avenue, Elizabeth, N. J.; graduated in medicine from Bellevue Hospital Medical College, New York City, in 1884; elected a Fellow of the Academy March 7, 1895; died, November 13, 1931. Dr. Wilson was a Fellow of the American Medical Association, a Fellow of the American College of Surgeons and a member of many other medical organizations.

WILLIAM ANDREW WILSON, M.D., 285 Madison Avenue, New York City; graduated in medicine from St. Louis University, in 1904; elected a Fellow of the Academy February 3, 1921; died, November 28, 1931. Dr. Wilson was a member of the American Urological Society, Consulting Urologist to Bergen County Hospital and Chief Urologist to Cornell Clinic.

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Surgery, 1st Friday.

Neurology and Psychiatry, 2nd Tuesday.

Historical and Cultural Medicine, 2nd Wednesday of November, January, March and May.

Pediatrics, 2nd Thursday.

Ophthalmology, 3rd Monday.

Medicine, 3rd Tuesday.

Genito-Urinary Surgery, 3rd Wednesday.

Orthopedic Surgery, 3rd Friday.

Obstetrics and Gynecology, 4th Tuesday.

Oto-Laryngology

## TRUSTEES, COUNCIL AND COMMITTEE MEETINGS

Trustees, 4th Wednesday.

Council, 4th Wednesday.

Committee on Admission, 1st Wednesday.

Committee on Library, 2nd Tuesday.

Public Health Relations Committee, Mondays.

Committee on Medical Education, 2nd Thursday.

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Donations and bequests are solicited by The New York Academy of Medicine for the maintenance and expansion of the Library.

A donation or bequest of \$5,000 or more will provide for a special library fund, the income of which may be used for the general purposes of the Library or restricted to the purchase of books and periodicals, as the donor or testator may indicate.

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## FORM OF BEQUESTS

The following is a brief legal form as a suggestion under which bequests may be made in behalf of the Academy:

I give, devise and bequeath unto "The New York Academy of Medicine" of the City of New York, State of New York, a corporation duly incorporated by the Legislature of the State of New York by an act entitled, "An Act to Incorporate The New York Academy of Medicine," passed June 23, 1851, and amended June 4, 1853, June 2, 1877, and April 23, 1924, . . .